TAPP (John)

The Honorable
Fraser Wilkins

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COLL 1900_

Not in Wing.

DB#314

THE

SEA-MANS KALENDER:

OR,

An *Ephemerides* of the *Sun, Moon,* and certain of the most notable fixed Stars.

AS ALSO

A Table of the *Longitude* and *Latitude* of all the most eminent places of the World: First calculated by JOHN TAP.

Since corrected and inlarged, with many Additions.

viz.

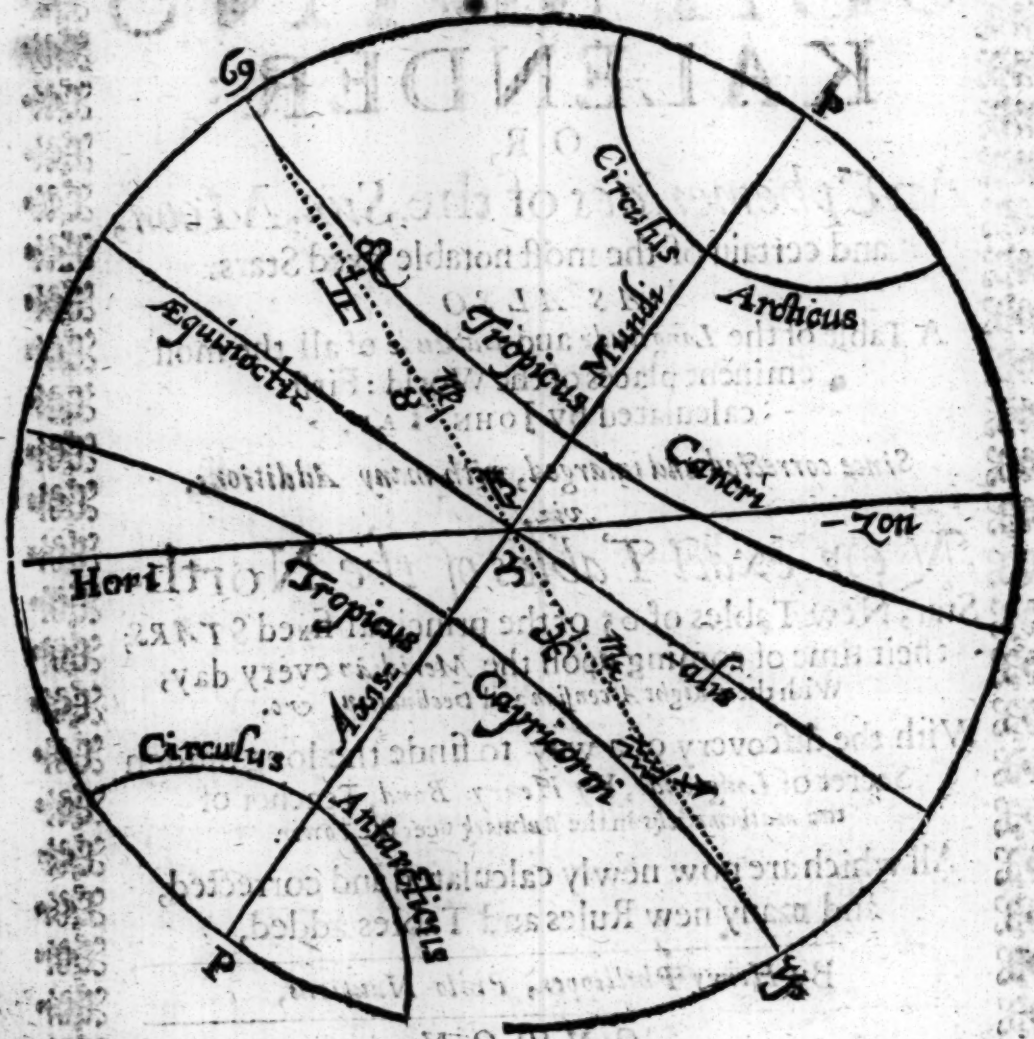
New exact Tables of the North-Star, New Tables of 65 of the principal fixed *STARS*; their time of coming upon the *Meridian* every day, With their *Right Ascension* and *Declination*, &c.

With the discovery of a way to finde the long hidden Secret of *Longitude*, By *Henry Bond*, Teacher of the *Mathematicks* in the *Bulwark* neer the *Tower*.

All which are now newly calculated and corrected, and many new Rules and Tables added,

By *Henry Phillippes*, *Philo-Nautica*,

LONDON,
Printed by *Will. Leybourn*, for *George Hurlock*, and are to be sould at his Shop at *Magnus* Church-corner in *Thames street* 1664.



Circulus
Arcticus
Tropicus
Mundi
Æquinoctii
Cancri
-Zon
Hori
Tropicus
Axis
Cayricorni
Circulus
Antarcticus

TO THE COVRTEOVS *Readers, health.*

GEntle and indifferent Readers, you who are ready to applaud that which is good, and passe over with silence that which is not hurtful, without scoffing the work, or deriding the Author: and who having some skill, are desirous of more knowledge in the *Art* of *Navigation*, and other Mathematical studies: to you I commit the censuring of my work, and heartily wish you the profit of my labours: knowing that the wise will rather wink at small faults, than rashly reprove that which may profit others, not pleasure themselves: And though (as I say) the curious and expert Mariners find nothing herein conteined, which may satisfie their expectation, yet I hope they will judge favourably of my intentions, and with patience pass it over for affection to the *Art* it self, wishing charitably that my skill were answerable to my will: As for the meaner sort, whose Experience have not been fitted with *Arts* rudiment, nor their judgement fined with demonstrative illustrations in the *Mathematical Sciences*, but only are now (as it were) setting themselves with willing minds to learn what before they wanted, I make no question, but as by these following *Tables* and *Propositions* they may reap profit; so accordingly, in yeilding friendly censures upon me & my work, they shall answer my expectation with full recompence of my passed labours: So intreating the courteous *Readers* to do me that favour, as to correct what they shall find amiss, either in the *Printers* oversight, or mine own errour: I shall not only endeavour the mending of them in the next *impression*, but be very thankful for them, when at any time they shall give me notice thereof, resting withal,

Your obliged Friend,

 JOHN TAP.

1471

To the ingenious SEA-MAN.

THis Book needs no commendations, having for a long time paſt ſo currently through the hands of moſt men. Indeed it is a Compendium (if well underſtood) of the whole *Art* of *Navigation*: But its chiefeſt excellencie conſiſts in the Aſtronomical part thereof; the Tables whereof are ſo plain and full, and well ordered, that there never were the like in any Book. And though theſe Tables are ſubject to grow old, and wear out of date, yet ſuch hath been the good fortune of the Book, and the care of the Stationer, that the quick ſale of the Book hath incouraged him ſtill to renew the Tables; for this means, the Book hath not only been preſerved in its firſt excellencie and exactneſs, but hath from time to time received the friendly Additions of Mr. *Henry Bond*, an ancient Profeſſour of theſe Arts. And whereas the reviſal thereof hath lately fallen into my hands, finding the Book to be of ſo great uſe, and ſo agreeable to my *Genius*, I have been the more careful to make ſuch Additions and Corrections, as will (I hope) be for the advancement of the Book, and the advantage of the Buyer: So wiſhing all proſperity to attend your Sails, I reſt,

Yours HENRY PHILLIPPES.

Philo-Nauticus.

ERRATA.

Page	Line	Faults	Correct
7	21	for 22 hours	read 24 hours
7	34	19 parts	29 parts
13	34	Governing	Government
16	30	Followeth	Floweth

In the Moneths.

Feb. 5. the Third year, ☉ declination, for 12 53, read 12 33.
Mar. 1. first year, ☉ declination, for 3 31, read 3 21.
In *May* for N. declinat. decreasing, r. N. declination increasing.
In *June* for South declination, r. North declination.
Aug. 30, first year, ☉ declination, for 5 48, r. 5 8.
In *Aug.* for North declination increasing, r. decreasing.
Decem. 23, first year, ☉ declination, for 23 56, r. 22 56.
In *Decem.* 18, declination Dog Star, for 16 33, r. 16 13.
And so in the Table of the Stars page 88.

Page	Line		Faults	Correct
76	23	for	0 dayes	read 10 dayes.
85	34		Starrs	Star is
86	21		59 deg.	49 deg.
98	34		Sun	Summe twice
99	1		7 h. 28	7 h. 48
112	19		40 deg.	46 deg.
117	3		80 l. 5 pts.	89 l. 50 pts.
158	2		15/16	1/16
173	19		In the Longit. of *Middleborough*, for 20 40, r. 29 40.	

The SEAMANS Kalender.

Certain Definitions, meet to be understood of those that will practise Navigation.

A Sphere or Globe is a round figure made by the turning of half a Circle, till it end where it began to be moved; or a massie body inclosed with one plat form or surface: In the middle whereof is a prick, from which all Lines drawn to the surface are equal.

Centre is the point or prick aforesaid, in the middle of a Sphere, Globe, or other Circle.

Diameter is a right line drawn through the Centre to the Circumference, or surface of a Sphere or Circle, to each end thereof.

Circumference is a round Circle equally distant on all sides from the Centre thereof.

Surface or Superficies is the upper part of any thing.

A Degree is the 360 part of the Circumference of any Circle.

A Minute is the 60 part of a Degree, being understood of measure: but in time, a Minute is ♃ 60 part of an hour or the fourth part of a degree, 15 degrees answering to an hour, and 4 min. to a degree.

The Pole is a point or prick imagined in the heavens, whereof there are two; the North Pole being the Centre to a Circle described by the motion of the North Star, or the tail of the little Bear; from which point aforesaid is a line imagined to pass through the Centre of the Earth, and passing directly to the opposite part of the Heavens, sheweth the South Pole.

The Equinoctial is a great Circle imagined in the Heavens, also dividing the Heavens into two equal parts, and lying just in the middle betwixt the two Poles, being in compass from West to East 360 deg. every degree thereof on the terrestial Globe, valuing 20 English miles, or 60 miles.

The Meridian is a great Circle dividing ♃ Equinoctial at right Angles into two equal parts, passing also through both ♃ Poles, and the Zenith: to which Circle the Sun coming twice every 24

hours

hours, maketh the middle of the day, and the middle of the night, every place hath a severall Meridian, but they all meet in the poles of the world.

Zenith is a point or prick in ỹ Heavens right over our heads, 90 degrees from the Horizon, as the Pole is 90 degrees from the Equinoctiall.

Nadir is a point or prick in the Heavens under our feet, opposite to the Zenith.

Horizon is a great Circle dividing that part of the Heavens which we see, from the other part which we see not.

Azimuth is a great Circle crossing the Horizon at right angles, as the Meridians do the Equinoctial, being as many as the Meridians, and as the Meridians concur & meet together in the Poles of the world, so do the Azimuths meet in ỹ Zenith, which is the Pole of the Horizon.

Parallels are Lines or Circles equally distant in all parts one from another, as all Circles of East and West are parallel to the Equinoctial.

Almicanterahs are Circles parallel to the Horizon, being also Circles of Altitude or Elevation, being that the Altitude of the Sun, Moon or Stars above the Horizon are described thereby: which Almicanters do crosse the Azimuths, as the Parallels or Circles of East or West do crosse the Meridians.

The Tropicks are two lesser Circles, parallel to the Equinoctial, limiting the bounds of the Zodiack, or ỹ greatest Declination of the Sun on each side of the Equinoctial. The Tropick of Cancer Northward, and the Tropick of Capricorn Southward, whose distance from the said Equinoctial are in these times, according to the best Observations 23 deg. and 32 min. ferè.

The Zodiack is a great Circle, crossing the Equinoctial in two opposite places thereof, and declining byas-wise therefrom, towards either of the Poles, touching the Tropick of Cancer on the North part, & the Tropick of Capricorn on the South part thereof. In the Zodiack are 12 Signes, viz. Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces, every Signe being 30 degrees in length, and 12 in breadth: Through which Signes the Sun passing describeth a Year, and the Moon passing likewise through the same maketh a Moneth:

Paneth: The 12 degrees that the Zodiack hath in breadth are allowed for the Latitude of the Planets.

Ecliptick is a Circle lying just in the middle of the Zodiack, out of which the Sun never goeth, but the Moon and other Planets are sometime on the one side, & sometime on the other side thereof.

The head and tail of the Dragon are two opposite points in the Ecliptick line of the Zodiack, which goeth backwards through all the 12 Signes in 19 yeares: And when it happeneth that the Sun and Moone are in conjunction or opposition in that place of ye Ecliptick, where the head or taile of the Dragon is, then is the Sun or Moone eclipsed: Each of the other Planets also have their proper Dragons head and taile; but this of the Moon is the most notable in regard of the Eclipses.

The Polar Circles are two little Circles distant from the Poles of the World, so much as is the greatest declination of the Zodiack from my Equinoctiall, in which polar Circles are the Poles of the Zodiack. The one of these Circles being about the North Pole is called the Artick Circle, the other being about ye South Pole is called the Antartick Circle. Some say these 2 Circles inclose all those Stars which neither rise nor set in any Latitude, but are alwayes above ye Horizon, where neither of the said poles are raised.

The Colures are two great Circles passing through both the Poles, crossing one another in the said Poles at right angles, and dividing the Equinoctial and the Zodiack into foure equal parts, making thereby the four Seasons of the Year, the one Colure passing through the Equinoctial points of Aries and Libra, sheweth the beginning of the Spring-time and Autumn, at which two times the dayes and nights be equall. The other Colure passing through the two Tropical points of Cancer and Capricorne sheweth the beginning of Summer and Winter, at two which times the dayes are longest and shortest.

Altitude, in the Heavens, is the height of any thing above the Horizon towards the Zenith.

Latitude is the wideneſſe and distance of the Planets or Stars from the Ecliptick, either Northward or Southward. Also Latitude is the Distance of the Zenith of any place from the Equinoctial towards either of the Poles, which is alwayes equal to the height of the Pole of the same place.

Longitude

Longitude is length, and in the Heavens, it is understood the distance of any Star or Planet from the beginning of Aries to the place of the said Planet or Star, or from ỳ beginning of any Signe to a certain other part or degree of the same: Otherwise Longitude in ỳ earth, is ỳ distance of the Meridian of any place from the Meridian which passeth over the Iles of Azores, where the beginning of Longitude is said to be. Longitude is counted upon the Equinoctial, and Latitude upon the Meridian.

Declination is the declining or distance of the Sun, Moon or Stars from the Equinoctial, and is said to be North or South, according to the Pole towards which it leaneth.

Amplitude is the distance of the rising and setting of the Sun, Moon or Stars from the true East or West points of the Compasse upon the Horizon.

Ascension is the rising of any Star, or of any parts of the Ecliptick above the Horizon. Right Ascension is the number of degrees and min. of the Equinoctial, which cometh to ỳ Meridian with the Sun, Moon, Star, or any part of the Ecliptick.

Oblique Ascension is the number of degrees of the Equinoctial, which cometh to the Horizon with any Star, or any portion of the Ecliptick: in which sort is Oblique Ascension also.

Ascensionall Difference is onely the Remainer, the one being subtracted or taken from the other.

The Golden Number or Prime, is the time of 19 years: in which time the Sun & Moon make all the variety of their Conjunctions, Oppositions, and other Aspects.

Epact is the 11 days and 6 hours, which are added to the year of ỳ Moon, being 354 dayes, to make it equal with the year of the Sun, which consisteth of 365 dayes ¼. By the Prime is found out the Epact, and by the Epact is found out the age of the Moon.

The Circle of the Sun is ỳ number of 28, because that in 28 years all the variety of Dominical or Sunday Letters, and Leap-years are expired, being that at the 29th year the Circle doth begin again: The use of which number is to find out the Dominical Letter for any year past, present, or to come: Where note, that there is but 7 Letters which serve for Sunday letters, viz. A, B, C, D, E, F, G. And albeit that in the dayes of the week they pro-

ceed

ted according to their naturall order of the Alphabet, yet in the years they go backwards: as if G be for one year, F shall be for the next, and when it is a Leap-year (which is every fourth year) then is there two letters for the year, the first serving from the 1 of January to St. Matthias day, which is then the 25 of February, and then the other letter takes place, and serves till the years end.

To find which number of the Suns Circle and consequently the Dominicall letter for the year proposed: To the year of our Lord adde 9, that totall divide by 28, and that which remains is the Circle of the Sun for that year: Then to know the Dominicall letter: Note that the 28 year the Dominical letter is A, and is the third from the Leap-year, therefore the first to begin withal again, is G F, because it is another Leap-year: and so counting the 7 letters backwards, and every fourth year counting two letters: That letter upon which the number of the Suns Circle ends, shall be the Sunday letter for the year proposed.

As for Example, Let the Year proposed be 1675, adde 9 thereto, so it makes 1684, that being divided by 28, the remainer is 4, the Circle of the Sun: then counting 4 letters backward, according to order, till I have counted four places, begining with G F thus: 1 G F, 2 E, 3 D, &c. I finde the fourth place ends upon C, which I conclude to be the Dominical letter for the year aforesaid. And it is the third after Leap-year.

And here is to be noted that the Prime and Dominical letter changes the 1 day of January, and the Epact the 1 day of March.

The Suns Circle, and Dominical letter		
1	G	F
2	F	E
3	E	D
4	D	C
5	C	B
6	B	A
7	A	G
8	G	F
9	F	E
10	E	D
11	D	C
12	C	B
13	B	A
14	A	G
15	G	F
16	F	E
17	E	D
18	D	C
19	C	B
20	B	A
21	A	G
22	G	F
23	F	E
24	E	D
25	D	C
26	C	B
27	B	A
28	A	G

To finde out the Prime.

Divide the year of our Lord by 19, and to that which remaines after the Division, adde 1: The product is the Prime number for all that year.

As for Example.

I would know the Prime for the year 1675, divide 1675 by 19, and you shall have in the Quotient 86, & after the division there rests 3, unto which if you adde 1 it makes 4, which is the Prime for that year 1675.

To find out the Epact.

Prime	Epact
1	11
2	22
3	3
4	14
5	25
6	6
7	17
8	28
9	9
10	20
11	1
12	12
13	23
14	4
15	15
16	26
17	7
18	18
19	29

ADd to the Epact of the year past 11, and if it pass 30, take away 30, and the Product is the Epact for all that Year: but otherwise, which is the better way: Imagine three places upon your hand, which for Example let be the three joynts of your fingers, and call or name the first joynt 10, the second 20, the third 30, then count the Prime number upon the three joynts aforesaid, and going over them untill you come to the end of the said Prime number, mark upon which your Prime ends, and adding the number of the joynt with the Prime, if they come not to 30, that shall be the Epact for all that year: if they pass 30, take away 30, and the remainer is the Epact, if it be just 30, then is the Epact equal to the Prime.

As for Example. The year 1675, the Prime is 4, and imagining the first joynt of my finger to be 10, the second 20, the third 30, I count upon the three joynts 4, the Prime number, viz. upon the 1 joynt I tell 1, on the second 2, on the third 3. Again, on the first 4, which is the Prime ending upon the first joynt, which I call 10, therefore adding 10, the number of the first joynt, makes 14 for the Epact of the year 1675 aforesaid.

To know the Moons age.

ADde to the day of the moneth, the Epact, and so many dayes more, as are moneths from March to the moneth you are in, including both moneths, and if they come not to 30, so much is the Moons age: But if they pass 30, take away 30, and the overplus is the Moons age.

This is when the moneth hath 31 dayes, but if the moneth hath but 30 dayes, you must take away but 29, and the rest is the age aforesaid; for in those months that have 31 dayes the Conjunction

junction is the 30 day of her age, and those moneths that have but 30 dayes, the Conjunction is the 29 day of her age.

For Example. The first of January 1675, I desire to know the age of the Moon. Because the Epact changeth not till the first of March, I adde the Epact of the year before, which is 3, and the day of the moneth 1, together, which makes 4, then January being the 11th moneth from March, edded thereunto makes 15, which is the age of the Moon, the said first of January, 1675.

A Declaration of the following Instrument, for the Tydes.

THis Instrument gives you a plaine and easie Order for the shifting of the Sun and Moon for every day of her age; and also it is a ready and most necessary reckoning of the Tydes, whereby also is shewn the common Order, to bring thereby the 32 points of the Mariners Compass to the 24 Houres of ♄ Day and Night, which are the first rudiments to be learned of a young Scholar or Apprentice in Navigation.

First here is the common Mariners Compasse, with the xxxii points thereof plainely set down, the Names being printed upon each severall point which must be perfectly learned without book; then is there in the uttermost edge a Circle divided into 24 parts which signifie 22 houres of the day and night, where you may see that 12 a clock at night is just upon the North point of the Compasse: 12 at noon upon the South point of the Compasse: at 6 a clock in the morning upon the East, and at 6 at night upon the West point of the Compasse, and so for the other points of the Compasse agreeing with the other houres every point of the Compasse makes ¾ of an houre, as you may see North and by East is upon ¾ of an houre past 12, North Northeast one houre and ¾ Northeast and by North 2 houres and ¼, and so of the rest.

Also to the Center of the Compasse is fixed a moveable Circle to turn round about the said Compasse, the uttermost edge whereof moving close within the Circle of houres is divided into 19 equall parts and a halfe, signifying the days of the Moons age, which are numbred in Arithmeticall figures from the first day of

her Age to her Conjunction or meeting againe with the Sun, at which place of her Conjunction is left a little Index or shewer, to direct you to the houres and points of ye Compasse: which Index also shews you how much the Sun and Moon are asunder, every day of her age, by telling the points of the Compasse betwixt, the number of the Moons age in the said moveable Circle, and the Index thereof, accounting for every point 11 degrees and $\frac{1}{4}$, Or else the number of the houres contained in the uttermost Circle betwixt the said number of the Moons age and the Index; accounting every hour for 15 degrees, shews the degrees of distance betwixt the Sun and the Moon.

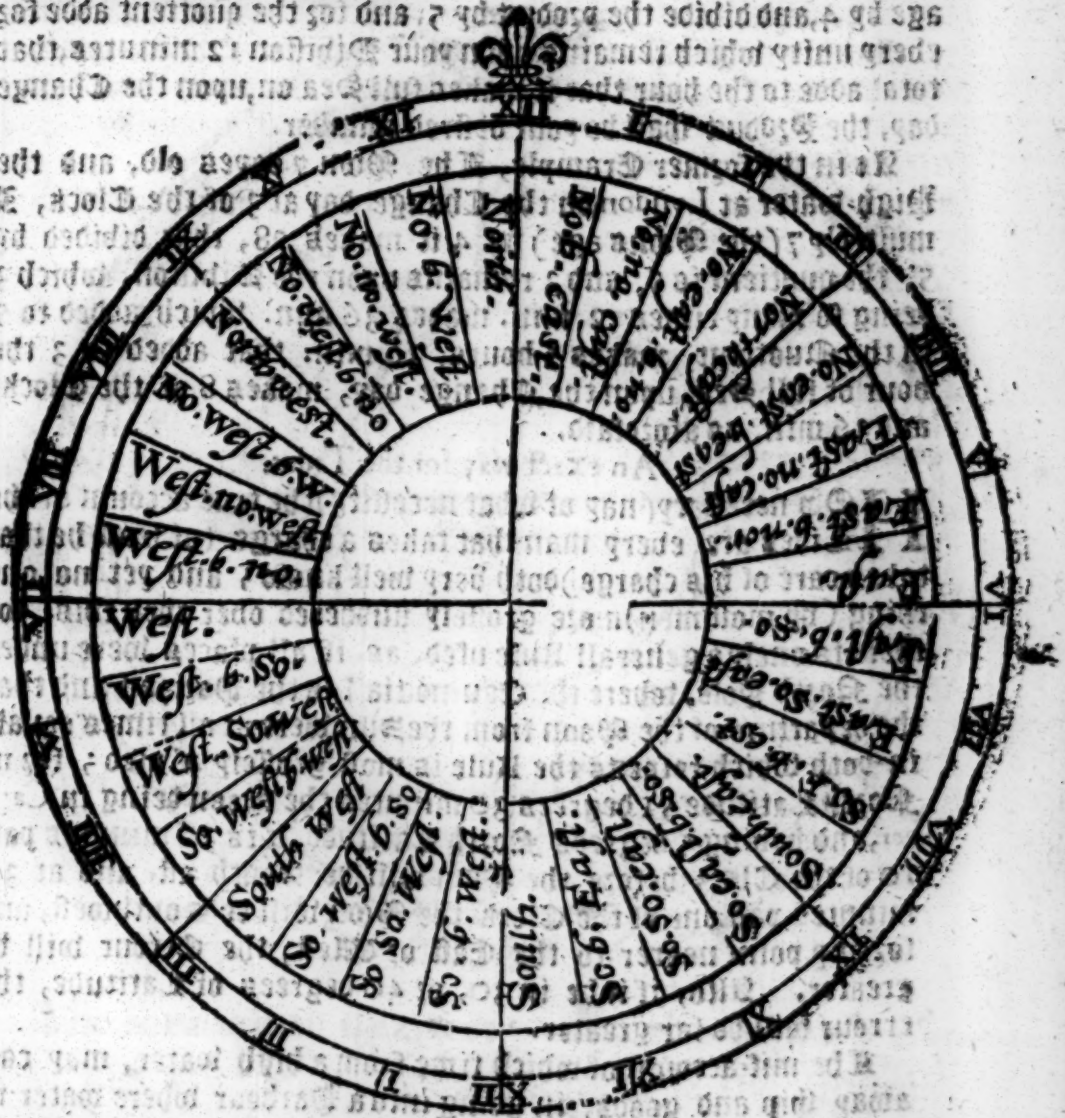
Now for to keep reckoning of the Tides thereby, you must know by the Table hereafter set for that purpose how it flowes: that is to say, what Moon makes full Sea or high water at that place where you would know the time of the Tide or high water for the day proposed: which known, you must also by the former Propositions, or else by the Kalender following, know the Moons age, then seeking out the number of the Moons age in ye moveable Circle, place the said number of the Moons age upon ye point of the Compasse which makes full Sea upon the change day at your place desired and staying it there, the Index which is in the said moveable Circle, points you directly to the point of the Compasse that the Sun must be upon, when it shall be high water, on the foresaid day in the desired place, and also in the uttermost fixed Circle it shews the houre of the day which you destre.

For Example. Suppose the Moon to be 7 dayes old, I would know how much the Sun and Moon are asunder. I seek in the moveable Circle for ye Moons age which being 7, I place 7 upon the North point of the Compasse, and the Index shews the East and by North, and $\frac{3}{4}$ to the East-ward, which is 7 points and $\frac{3}{4}$, that multiplied by 11 $\frac{1}{4}$ the number of degrees that belong to a point of the Compasse, makes 87 degrees 32 min. for the distance betwixt ye Sun and Moon, and in houres it shews 5 $\frac{3}{4}$, which multiplied by 15 yeelds the like, being very neer $\frac{1}{4}$ of the Zodiack.

Then for the Tides, at London Bridge, it flows Southwest and Northeast, or is high water at 3 a clock on the change day, therefore when the Moon is 7 dayes old, I place 7 ye Moons age upon the point Southwest, or 3 a clock, and staying the moveable run-

dle

dle there, I see that the Index shews almost Northwest, which is 40 minutes nearer hand, or neer 3 quarters of an hour past 8 of the clock; at which time shall be high water at London bridge, the Moon being 7 dayes old.



Againe, at Harwich where it flowes South and by East, the moon being 10 dates old. I lay 10 (the Moons age upon that point of the Compass South and by East, and then the Index shews the point West Northwest of the Compass, and in the

Circle

Circle of hours one third part of an hour past 7, which is the time of the full Sea at Harwich, the moon being 10 days old.

But if you want a Table or Instrument to work the Account of the Tides, you may do it by memory, multiplying the Moons age by 4, and divide the product by 5, and for the quotient adde for every unity which remains upon your Division 12 minutes, that total adde to the hour that it makes full Sea on, upon the Change day, the Product shall be your desired number.

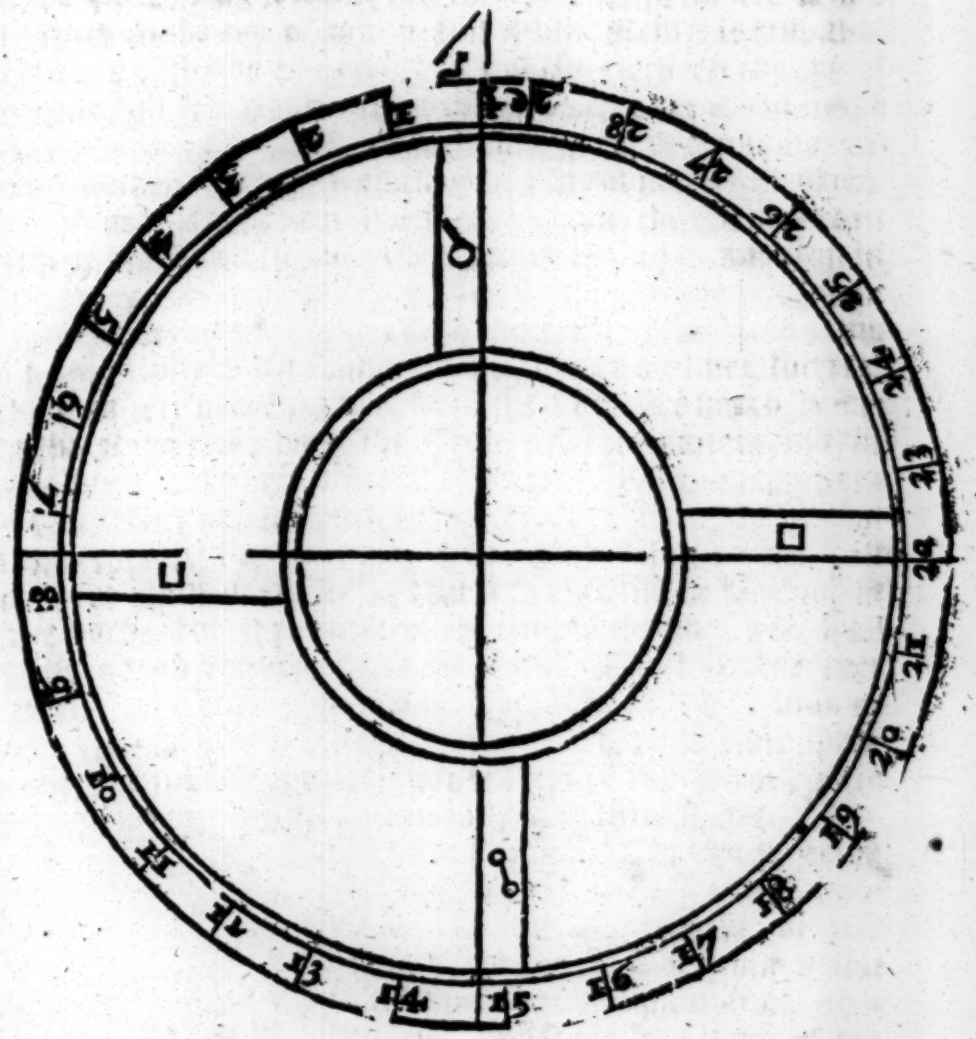
As in the former Example, The Moon 7 dayes old, and the High-water at London on the Change day at 3 of the Clock, I multiply 7 (the Moons age) by 4 it makes 28, that divided by 5, the quotient is 5, and 3 remains upon the Division, which 3 being so many times 12 min. makes 36 min. which added to 5 in the Quotient, makes 5 hours, 36 min. that added to 3 the hour of full Sea, upon the Change day, makes 8 of the Clock, and 36 min. as aforesaid.

An exact way for the Tides.

How necessary (nay of what necessity) the true account of the Tides are, every man that takes a charge (at least he that takes care of his charge) doth very well know; and yet no one thing (by most men) more grossely slubbered over then this, for there is onely a generall Rule used, as if all places were under the North Pole, where the Equinoctiall is the Horizon and that the departure of the Moon from the Sun were at all times equal; in both which respects the Rule is most grossely abused; for in North Latitude 51 degrees 30 minutes the Moon being in Cancer, and having 5 degrees North Latitude, it is 30 minutes past 10 of the Clock before the Moon will be South east, and at 30 minutes past one of the Clock, the Moon will be Southwest, and for any point nearer to the East or West, the Errour will be greater. Also, if it be in 30, or 40 degrees of Latitude, the errour will be far greater.

The mis-account of which time from a high water, may cast away ship and goods, in going into a Harbour where water is scarce, where it is to be looked unto and respected. To correct this errour I will here propound a very exact, easie, and speedy way to account the Tides.

First you must understand, that in observing the Tides, the best way is to go by the time of the day shewed by the Instrument,



The four white quarters within the utmoſt Circle, are to be cut out, and then the figure to be placed upon the *Compaſſe* on the former leaf.

The four white quarters within the uttmoſt Circle, are to be cut out, and then the figure to be placed upon the Compaſſe on the former leaf.

and not by the Moones being upon such a point of the Compass, my meaning is thus. The Table shews it is high tide at London, the Moon being S. west, and this by the Instrument is at 3 of the clock on the day of new or full Moon. Now it is true, that it is always high tide at London at 3 of the clock on the day of the new or full Moon; but if you should observe the Moon in the Heavens by your Compass, you shall finde, ỳ the Moon is not alwayes Southwest at 3 of ỳ clock upon ỳ day of new & full Moon.

For Example. At the new Moons in June, and the full moons in December, the Moon is about the Tropick of Cancer, and then in the Latitude of London, she is Southwest at 3 quarters of an hour past 1 of the clock, but it is not high tide till 3 of the clock, and then ỳ Moon will be W. Southwest, which is two points further.

Also it is very necessary to observe the difference which is between the Neap-tides, when the Moon is in the quarters, and the Spring-tides at the new and full Moon. For the neap-tides will be an Houre and somewhat more, sooner then ỳ Instrument doth shew them. For Example, The Moon being in the first quarter, the Instrument shews that it is high tide at London, at 9 of the clock: but if you observe the time of the tide, you shall finde ỳ it is high tide before 8 of the clock. The like difference (I believe) is in other places. Therefore to know ỳ true time of the tides you must subtract some minutes from the time shewed by the Instrument, according to the age of the Moon, as is shewed by this little Table.

The Moons age				Subtract	H	M
1	14	16	29		0	0
2	13	17	28		0	5
3	12	18	27		0	10
4	11	19	26		0	20
5	10	20	25		0	30
6	9	21	24		0	45
7	8	22	23		1	00

For Example. The Moon being 5 days old, it is high tide at London, by the Instrument at 7 a clock, but you must by this Table subtract 30 minutes from this time, and so the true time of the tide at London is at 6 of the clock and 30 minutes.

The Governours of the Planets

Divers Writers have disagreed concerning the Planetary houres, some making the houres of ỳ Planets equall with

the hours of the clocks, and so continuing their Regiment orderly with the other common hours, some again beginning the said Planetary hour at Noon, some at Midnight, and some again at Sun-rising: Which indeed for the time of the beginning of the accompt is best, and for the difference of the equality and inequality between the Planetary hours, and the common hours of the clocks. Gemma Frisius agreeing with the best Astronomers, saith, That as the days and nights do increase or decrease, so must the Planetary hours be longer or shorter accordingly, nevertheless, so that there shall be 24 Planetary hours in the Day and Night, as well as of other hours: but that if the day consist of more then 12 hours, then proportionably the Planetary hours to consist of more then 60 min. And if the day be less then 12 hours, then the Planetary hours are to be less then 60 minutes: and if the Day be just 12 hours, then the Planetary hours are equal to the hours of the clocks, and not otherwise. The like is to be understood in the Nights, and to make an equality of the Planetary hours to them of the clocks, being that how long soever the day is, yet there must be but 12 Planetary hours, and how short soever the Day is, there must (nevertheless) be 12 Planetary hours, which are sometimes greater, and sometimes lesser then the common hours of the clock, which always consist just of 60 minutes; therefore if you divide the day into 12 equall parts, one of those parts shall be the quantity of a Planetary hour which you may do thus: Multiply the hours of the day into minutes, by 60, and if there be any odde minutes adde them to the Product, the total being divided by 12: the Quotient shews the number of minutes contained in an unequall or Planetary hour.

And again, if at any hour of the Day or Night, you know not what Planetary hour it is, that is to say, how many Planets ruled since the beginning of the day or night proposed, Multiply the number of the hours past from Sun-rising by 60, and divide the Product by the number of the minutes contained in an unequal or Planetary hour, the Quotient will shew you how many hours and minutes of the Planets are past from the Sun-rising (if it be in the Day) or from Sun-setting, (if it be in the Night) which known, enter the Table following, to know what Planet

rules that

that day and hour proposed, looking for the houre desired in that column, which is right under the day proposed: those Planets which are Governours of the said houres in the day-time being placed on the side next the left hand, and the Governours of the night next on the right hand.

Governours of the Day	Sunday.		Munday		Tuesday.		Wednesday		Thursday.		Friday.		Saturday.		Governours of the Night
Sol	01	11	09		00	10	00	11		Jupiter
Venus	02	00	10		00	11	01	12		Mars
Mercu	03	00	11		01	12	02	10		Sol
Luna	04	01	12		02	00	03	00		Venus
Saturn	05	02	00		03	00	04	01		Mercur.
Jupiter	06	03	00		04	01	05	02		Luna
Mars	07	04	01		05	02	06	03		Saturne
Sol	08	05	02		06	03	07	04		Jupiter
Venus	09	06	03		07	04	08	05		Mars
Mercur	10	07	04		08	05	09	06		Sol
Luna	11	08	05		09	06	10	07		Venus
Saturn	12	09	06		10	07	11	08		Mercury
Jupiter	00	10	07		11	08	12	09		Luna
Mars	00	11	02		12	09	00	10		Saturn

Example.

The 17 day of May being Sunday, at 9 of the clock in the morning I would know what Planet rules; First, in the following Kalender, I find that the 17 of May the day 16 houres long therefor I multiply 16 houres by 60 minutes and the product is 960 That divided by 12, brings in the quotient 80 min. for the length of the Planetary houre at that time then from foure of the clock, (the time of the Suns rising) till nine a clock, the houre proposed is 5 houres which multiplied by 60 brings 300, that divided by 80 (the length of the Planetary houre) brings in the Quotient 3 houres, and there remains upon the Division $\frac{60}{80}$ parts, that is three quarters of a Planetary houre more: so I conclude, that at 9 of the clock 3 Planets have past their Regiment, and the fourth hath ruled 3 quarters of his hour: Therefore under the title Sunday in the top of the Table I look for 4 toward the foot of the said Table, against which on the left hand is placed Luna, therefore I say, that the 17 day of May being Sunday, at 9 of the clock in the Morning, Luna shall have reigned 3 quarters of her houre.

A Rutter for the Courſes round about *Ireland*, from Cape to Cape, and what Tide it makes in every Harbour, and how many Leagues it is from Harbour to Harbour.

IN primis, from Cape-Cleer to the Maſon-Head is 7 Leagues, and lieth Weſt and by North, and Eaſt and by South, you ſhall finde a Haven North Weſt from Cape-Cleer, Called Crook Haven, and it flow-eth there Eaſt Northeaſt and Weſt Southweſt; you muſt go Weſt to enter into it.

From the Maſon to the Durzib, is 7 leagues, and lieth Weſt North-Weſt, and Eaſt Southeaſt.

Bear Haven lieth from the Maſon-Head, North northweſt 3 leagues and a halfe: you muſt goe Northweſt into the Haven, it floweth E. northeaſt, and W. ſouthweſt: If you will anchor between the Durzib and the main land, you muſt go about the Iſland, for the Eaſt ſide is not found

The three Iſlands that be of the point of the Dourzies, which is called the Bull, and Cow and the Calfe, they be ſound, and you may go within them, or elſe between them, for there is no danger but what you may ſee.

Dourzies and Blaskey lie North and by Weſt, and South and by Eaſt, and there is betwixt them 12 leagues, the Skellocks is between both, and it floweth northeaſt and ſouthweſt.

Northeaſt off the great Skellocks, at 2 leagues off you ſhall finde the entry at Valens, you muſt run E. ſoutheaſt to enter in, it floweth E. Northeaſt; you muſt borrow of the Iſland to enter in, for the point on the Eaſter ſide is long.

North northeaſt of the great Skelloks 6 leagues off, you ſhall finde the Haven of Ventry, which is a good Roade: It followeth Eaſt northeaſt.

North-

Northeast by North off the great Skellocks 7 leagues you shall finde the Haven of Dinggel, without the Haven is a Rock called the Croo, which is found on both sides: The rock doth not cover but on a Spring-tide: You must run Northwest, and by west into the Haven, it floweth E. Northeast & W. southwest.

The Ventry, and the Sound of Begue lieth South by East and North by West 3 leagues, and when you are sailed into the sound of Begue, you must lie East and by North into the Road against a red Clift, which is on the South side.

Southeast of the Sound of Blaskey, at six leagues off, you shall finde a good harbour, named Begue which is to the Northeast off Valence: the said Haven hath two entries, but the West side is the best: you must take great heed of a sunk Rock that is on the Islands side, which you must leave on your Larboord side going in, and it floweth East northeast, and West southwest.

You shall understand that the said sound of Blaskey lieth Southeast and Northwest, but you must take heed of a shoald, that is on the East side, athwart the Scrabras.

From Blaskey to Smirrick, is 3 leagues, and if you enter into the Haven you must go Southwest into it: it floweth East northeast and West southwest.

There is a Hill to the Eastward of Smirrick, which is called Sinbrandon, go from Smirrick East northeast, and you shall go with Lopus-Head, which maketh entry of the River of Limerick, on the North side: there is from one to the other 10 leagues.

Smirrick, and the head of the Kerry, lie East northeast, and West Southwest, 7 leagues asunder, and there is within the Bay three Islands called Salline.

From Laupshed to the Seaties, is 7 leagues, they lie E. N. E. & W. S. W. and if you enter into the River, take heed of a shoald half way between Lawpshead, and an Island called Scrick, which you must leave on the South side, and to the East ward of that Island is a good road: It floweth E. N. E. and W. Southwest.

From Scatrick to Quoine, is 5 leagues, you must go East, and you shall finde two Islands, they be flat Islands, go to the Northwards hard aboord them, and from thence run E.

North-

Northeast, and you shall finde a Rock called the Bieff, go hard aboard the South side of the said Rock, called the Bieff, and when you are at the said Rock, you must row Southeast, and you shall finde another Rock called the small Bieff, then go with the Island of the entry of Dorley, and borrow aboard the Island as near as you can, for fear of the bank going into the Haven, and you must moor at the Castle by your Cables, for there goeth a great tide, it floweth East Northeast, and West Southwest.

The Sound of Blakey and the Islands of Arran, lieth North Northeast, and South Southwest, and there is between them 16 leagues: the Islands lie East and West, and makes the entry o Galloway and of the other Islands: there is one which is naught, but the West Sound is good, and the next sound to it is good, which is called the little Sound, but the Sound coming from the East is nought, but the next comming to the Blackshore from the East is partly good but you must put the two partitions to the Island, for it is dangerous: You must understand that there is one Island in the course way betwixt Lawpshed and the entry of Galloway, that had a great Kanie, a league & a half of the main land.

If you go before the Town of Galloway, go aboard the Black shore, and bring the Blackshore South-east of you, then go North-east, and you shall seech the Island called Motton Island, and there is between them toth three leagues: You must not trust to the North shore, for there is a shold half way to the Black-shore, and the Island of *Motton* is thwart of two white points, which is on the North side.

The said should is upon the West South-west side of the said Island of Motton, a league and a half of at a spring tide, then shall you see it dry, and it floweth at the said Island East North-east, and West Southwest.

The Sound of St. Gregory, and the Road of Galve, lieth East Northeast and W. Southwest, & there is betwixt them 8 leagues.

The Sound of St. Gregory and Silvis-head, lie South east and North west, and the distance betwixt them is 9 leagues.

Slinshead and Sark lieth North by West distant 15 leagues.

Black-rock is an Island which is West of Kilhead, a league off

of the Cape, and the said Black-Rock, and the Stags lieth Nozth-east, and by Nozth, and are distant 12 leagues.

From the said Black-Rock run Nozth, and you shall finde the Iland of East Eaves, and there is between them 2 leagues.

South southwest of the Stags, there is a Haven called Broad Haven, from the Haven to the Stags is two leagues: Stags is a Cape that maketh the entry of the River of Rasten, they lie East and West, and are distant 8 leagues: the Stags & Cape of Tellen lie Nozthest and Southwest, and are distant 15 leagues.

Betwixt the Stags and the Cape of Tellen in the Way, is the Haven of Moy, the Haven of Potway, the Haven of Slego, the Haven of Balecshanen, the Haven of Dongal, the Haven of Kellekeg, and the Haven of Tellen.

The cape of Tellen, and the Iland of Arrond, lie Nozth Nozthest and South Southwest, and are distant 7 leagues.

The Iland of Raghlenburn and Tellen, lie Southwest and Nozthest, and are distant 2 leagues.

The Iland of Raghlenburn and the Iland of Torre, lie Nozth nozth east, & South south west, & are distant 14 leagues.

To the Eastward of Torre, is a Cape called Hornhead, and are distant two leagues: Southeast of Hornhead is a haven called Shep-haven, it floweth East to West, but you shall have in the Way a good Road for all windes; the said Haven is a broad Haven, and is two leagues from the Cape.

Hornhead and the entry of Lough-foil, lie East Nozthest and West Southwest, and are distant 6 leagues.

The entry of Lough-foil, and the Iland of Enesterhould lieth Nozthest and Southwest, and are distant 5 leagues.

The Iland of Torre and the Iland of Enesterhould, lieth East and by Nozth, and West and by South, and are distant nine leagues.

The entry of Lough-foil and Enesterhould, lie Southeast and Nozthwest, and are distant 9 leagues.

The Iles of Enesterhould and Skirris Portruth, lie East south east, and West Nozth West, and are distant 10 leagues.

You must understand, that the River of Lough-foil, lieth

from Skirrish Portrush, West Southwest, and East Northeast, and there is betwæn them the River of the Band: There is betwæn Portrush & Loughfoil 5 leagues: There is in the entry of Loughfoil, a sand which is called ℔ Tonnes which is dangerous for any ship of charge: Also there is a Channel on the East side of the Tonnes, hard aboard the shore, but you must have your Tide: It floweth East by South, and West by North. Skirris and Portrush lieth South and North, & are distant 12 leagues. Skirrish, Portrush and the Illands of the Raghlings, lie Northeast and by East, and Southwest by West, and are distant 5 leagues: it floweth in Skirris East southeast, and West Northwest; the floud cometh from the Eastward.

Off the Raghlings is a Cape called the fair Forland, and betwixt them is a leagwe and a half: the fair Forland and the Knee lieth South South East, and North Northwest, and are distant nine leagues.

The fair Forland & Loughrian in Scotland, lie East Southeast, and West Northwest, and are distant 15 leagues.

There is betwixt the Knee and Carick vergus 5 leagues.

The point of Loughrian, and the Illands of Commoras, off Scotland lie North and South; you must passe by Ellif, and by the Haven of Lambach, asunder 7 leagues.

The point of Loughrian and Compnam Illes, lieth Northeast and Southwest.

The Knee, and ℔ Rock of ℔ Maidens, lie Northeast by North.

The Knee, & Else in Scotland, lie Northeast by east, distant 10 leagues.

Lorian in Scotland, and the Mould of Galue, lie South southeast, and North northwest, and are distant 7 leagues.

The Mould of Galue, & the Calfe of Man, lie South southeast, and North northwest, and are distant 10 leagues.

The Compnam Illes & the Roade Carick vergus, lie East and West, and are distant 14 leagues: it floweth in the Sound, East southeast and West North west.

Compnam Illes, and the point of the Moulens, lie South southeast, and North northwest, and are distant 7 leagues.

The

The point of the Mouſnes, and the Iſle of Lambay, lie South ſouthweſt, and North Northeaſt, and are diſtant 21 Leagues.

Lambay and Carlingford, lie North 1 eaſt, weſt, and South ſoutheaſt, and are diſtant 18 Leagues.

Lambay and the Iſle of Dalke lie South ſouthweſt, and North northeaſt, and are diſtant 5 Leagues.

The bank of Icklo, W beginning thwart of the North of Dublin, and continues to the Iſle of Tosker, they lie North by weſt, and South by eaſt, and they lie in length 24 Leagues.

Tosker and the point of the Grenord, lie Eaſt and by North, and Weſt and by South, diſtant two Leagues.

And when you are bound to the Eaſtward off the Grenord, you muſt keep the Mountaine of Waſhford above the low land, and ſo you ſhall go clear of all the dangers betwixt you and the ſhore: And if you cloſe the Mount with the low land, then you ſhall go with the dangers.

Tosker and the Cape of Carwall lie South by Eaſt, and North by weſt 40 Leagues.

Tosker and the Salts lie Eaſt northeaſt, and Weſt Southweſt, diſtant 6 leagues.

The Salts and Silly lie South and North, and are diſtant 33 Leagues.

The Salts and the tower of Waterford, lie Eaſt and Weſt, and are diſtant 5 Leagues.

The tower of Waterford and the Iſle of Ballecutin, lie ſouthweſt by weſt, and Northeaſt by eaſt: but between the tower of Waterford and Ballecutin is a Haven called Vognall and a ſeaboard it is an Iſland called Capel-Iſle, and between Capel-Iſland and Bellecutin is 4 Leagues.

The Tower of Waterford and Helvick-head, lie Eaſt & Weſt diſtant 3 Leagues.

Capel-Iſland, and the Iſland of Bellecutin, lie Weſt ſouthweſt, and Eaſt Northeaſt, and are diſtant 3 Leagues and a half.

Ballecutin and Cork Haven lies Weſt by ſouth, and Eaſt by north, and are diſtant 3 Leagues and a half.

Oyery Haven, and the Mobhead of Kinſale, lie Southweſt and Northeaſt, diſtant 3 Leagues and a half.

The Haven of Kinsale lieth from the Old head, North north-east; and going in, you must keep Bane Castle upon the West-land.

The Old head and Cape Clear lie West by South, and East by North, and are distant 14 leagues.

Cape Clear and Silly lie East southeast, and West north-west, distant 50 leagues.

There lieth from Falsen a Haven called Creek Haven, and is from it Northwest, distant 4 leagues.

There is a Haven called Scol Haven, which lieth from Falsen North and by West, distant 5 leagues.

There is a Head-land halfe way betwixt the Old head of Kinsale and Baltemore, which is called Kendonteedo, and it lieth Northwest by west, from it is a good haven called Clendor, there is a high land to the Eastward, you must go under that high-land, and so into the Haven. There is a nanny of rocks on the West land that goeth to the Eastwards: Therefore keep the East side, and when you come in, Ancor before the Castle. There lieth West Northwest, from the said Head, a good Haven called Castle Haven, 4 leagues from it; and if you come out into the sea, and meet with the Stags, you must go Northeast into Castle-haven, and in the entry there is an Island, which you must leave on the East side of you, and another flat Island, which you must leave on the West side of you; you may go dry at low water from it to the main, for it is very nigh to the West-land, but be bold on the Easter Island, and go right with a Chappel that lieth on the West side of the main Land, and when you are thwart of the Chappel you shall see a Castle on the West side, and thwart of the Castle you may enter in 12 fathom, it is from the Stags three leagues and a halfe.

You must understand, that the flood shoots from Dourze, to the Old head of Kinsale, North Northeast, and the Ebb to the contrary, and from the Old head to the Tower of Waterford Northeast and Southwest, and from the Dourze to the Northwards, North northeast, and South southwest.

If you will go in betwixt the Old and the North head of the ground.

grounds in Dalky, you must bring a round hill that stands like a sugar-loaf N. Northeast, and you shall have ten fatham: It floweth southeast alongst the Channel and the Bar of Poulback. there is eight foot water upon it at low water, and three fatham at full Sea: your Bar lieth South and North, and you shall have in the Road at Poulback, fourteen foot at low water.

To sail from Dalky to the Road of Poulback, you must keep a small Rock open, a hand spike length, and when you come to the Bar, you must lie West southwest up into the Road within the Beacon, then must you Ancor in four fathams at high water for there are two Hills on the Southside at high Hill and a low round Hill, bring them both in one, and then you be in the best of the Road. A south southeast moon makes a full Sea.

A Note for going into Milford.

If you come from Milford, you must leave all the Islands to ye Westward, and when you have the Grashom North Northwest, then the Haven beareth Northeast by North, and when you come into Dall Road, you may ride in three fatham and a halfe at low water, it floweth East by North.

Milford goeth in close under Cowein and Scabon, to the Eastward, and when you come open of Milford, you shall see an Island like the Mawstone, which lieth on the East side; and in Dall road you may ride for all windes; the Small lieth from the Grashom three leagues, and between them lieth a Ledge of Rocks, which is dry at low water; it lyeth mid-way, and it is very dangerous comming between them.

A general and compendious Tide Table, shewing what *Moon* makes full Sea, or High Water in all these places following.

Full Sea on the Coasts of *Zutphen*, *Friezeland*, *Holland*, *Zealand*, and *Norway*.

At the Jutlandish Isles, before ye Rivers of Hever, Fider and Elve, S & N

At Ancuisen S & N

The Isle of Urke, before Delfer Isle, at Embden, and all the shores of Flanders, S & N

Before the Maers Deep, E & W

At Hamborough, and Aenwerp, E & W

Underneath Holy-land W S W

At *Egmont* and Harlem, S E

In the Bresond and Yond, W S W

Before the Eastern and Western entrance of the *Ems*, or river of Embden, before all the coast of Friesland, and the Fl, E S E

Before the Ghests of Texel, W S W

Upon the Flats of West Friesland, Wyering and Amsterdam, S W

Without the banks of Flanders, S W

Dordrecht and Zierick sea, S W

Rotterdam, and from Harlem to the River of Maes, S W

At Ward-house, E & W

At Brihac E S E

Cape Gallant, S by E

The havens of Yotland and Norway, S & N

At Corpus Christi Point, S S W

Before the Fen in the Channel at Horn, Edam, Isle of Gore, before the Maes, before Camfer and Terver, S S W

Before the *Willing*, and all the coast of Zealand, S S W

North-Cape and Blangorow, S W.

Fox Nose, and St. Nicolas road W S W

Full

Full Sea on the Coast of *France*, *Spain*, and *Portugal*.

At Blackness, Armuy, Rammekins, and Camfer, S S W
Within the Fosse of Caen, SSE
Callice-road and Diep, S S E
At Bolem, Calice Graveline and Dunkirk half tide, S & N
The Island of Basse, S E
Within the Seyn, before the Casquets, and before Garnsey, S E
Before Cherborough, and the Rase of Blanquet. S & N
At Newport, half tide, S & N
At Seyn-head, S S W
At Garnsey, & before S. Poule, W by S.
Bell Isle, and Holy Isle S W by S
Without Ushant, & before Burdeaux, E & W
Brittain, Penmark, Poictu, and Gascoign, S W
Rase of Fontnes, W by W
Bloy & St. Matthews, W S W
Abrouarth & St. mallowes, w by S
Before the Killiats, S W
Portwise, and before the River of Burdeaux, S W
From the Rase to the Pole-head S W
Before the River of Naunts, and before the Bay S W
In the Bay within Ushant, W S W
At the Sept. Isles, and at Calic, in the Creek, W S W
Within the River of Roan, & from the Pole-head of Burdeaux to the Foreland of Fountaines before Brovage, in the River within all ye Havens aforesaid, it floweth S W by W
At St. John de Luze, S S E
At Concalo and St. *Malo*, E & W
At Cape St *Maries*, E by E
On all ye Coasts of Biskay, Galasia, Portugal, and Spain it floweth Southwest and Northeast.

Scotland.

In St. *Magnes* Sound, SE by E
At Fair Isles, S E
In the Frith, S S E
Fair Isle Roads, S by E
At Orkney, S E

England.

At Barwick it flows, S S W
At the Staples half tide, N E by E
At Houncliff foot, half tide, N E by E

At Flambrough head one quarter-tide, ENE
At the Shoo, S and N
At Tinmouth a quarter-tide, SW
At the Sperne, W by S
Newcastle and Humber, W by S
Winterton, ESE
Black-tail and the Nowre, S by W
Blackney & the Shields, E and W
Yarmouth, SE by E
Oxford and Albrough, SE by S
Whitby and Robin-Hoods Bay, SW
Before Hartlepool, S W
Scarborough one quarter-tide, WSW
Hul and Lin halfe tide, E & W
Before Humbers mouth, NW
At Burnham one quarter tide, E and W
Cromer, SE
At Liestow a quarter tide, SSE
Harwich and Dover, SSE
Harwich within, S by E
South Foreland, SSE
Before Margate and Thames-mouth, S by E
Leigh and Kentish knot, S and N
Spits and along the Swine S and N
Between Tinmouth and Flambrow-head, SW
Between Flambrow-head, and Bridlington Bay, SW by W
Between Bridlington and Lawrenas, WSW
Between Lawrenas and Cromer, along the west halfe tide. E & W
Between Cromer and Yarmouth road, SE
Between Laistow road, and Orfordnesse, SE by S
Between Orford and Orwell wades, SSE
Between the Nase & the Warehead of Colne, S by E
At the outer end of the Nore, S by W
Rochester and Maldon, S by W
At Gravesend, SSW
London, and the mouth of the Heads or Straights, SW
At the North Forelands SSE
At Beachy S and N
Seven Cliffes, SE
In the Downes, SSE
In the Chamber and at Gore-end S by E
At Chamberneese, and at the Needles, SE by S
In Chamberneese Road, SSE
Portsmouth, Hampton, and the Isle of Wight, S and N
In the Offing from the North Foreland, to the South Foreland, it runneth halfe tide, and from the South Forland, to the Nesse it runneth halfe tide, and halfe quarter tide, and

and from the Neſſe to Fairly one halfe tide, and from Fairly to Beacy, one quarter tide under other.

At Portland Road, E S E
At St. Elens, S E by E
Within the Race of Portland, At Poole in the Haven: At Home head, and thwart of Plimouth and Dartmouth, S E
At Waymouth, E & W
At Famouth, Foy, Fourne, Plimouth and Dartmouth, W by S
Briſtow and Foulneſſe, E by S
At the Start E by S
Mouſhole, W S W
St. Davids-head, E & W
Milford Haven, E S E
Iſle of Man and Carnes, S E
Three leagues off the ſhoze, at the Lizard to the ſhoze, and to the Lands end E S E
Within Torbay, and in the Bay of Canarven, W by S
At the mouth of Severn W by S
At the Moonles, W by S
From the Lizard to the Sorlings W by S
Before Silly in the Channel, E & W
At Silly halfe tide, S S W
Within Mounts Bay, and in the Sea of Wales and Severn W S W
At Lundy and the Holmes of Briſtow, E & W
In the Sleeve, between Silly and Vſhant, S & N

Note that the flood ſets not in at the Eaſt end of Wight, till a Southeaſt moon, in the Road of Durgeneſſe, South ſoutheaſt: But without in the Channel a ſouthweſt moon makes full Sea: from the Scames and in the broad Sound between it and Vſham, the flood runneth Eaſt Northeaſt, and Weſt Southweſt.

Ireland.

At Caldy W by S.
Waterford & Abermorick, E & W.
At Cape Cleer, E S E
Machnels Caſtle, S E by E
Dublin and Lambay, S E by E
Dunbar and Kildnie, S E
Dungarum, Kinſale, Cork Haven and Baltemore, W S W

The

The Course of all the Coasts of *Holland*, *Zealand*, *France*, and *Spain*, upon what point, and what distance they are.

From the Isle of Texel unto Egmont, S and by VV leagues 5
From Egmont unto the Maze, S S VV l. 11
From the Maze unto the VVieling S VV l. 12
From the VVieling unto the head or straight between Dover and Calice VV S VV l. 18
From the Isle of VValkeren or Flushing unto Calice S VV & by VV l. 22
From Blackness unto Deep, S S VV l. 12
From Deep unto Seyn-head or ye Riber of Seyne, VV S VV l. 11
From the Seyn-head to the Riber of Can, S VV l. 8
From thence unto Cape de la Hague, N VV l. 12
From thence unto the Caskets, VV & by N l. 18
From the Caskets to Garnsay, S VV & by VV l. 4
From Garnsay to St. Malo, S E l. 10
From Garnsay to the Sept. Isles, S VV & by S l. 12
From the Seven Isles to St. Powle. VV S VV l. 8
From thence to the Fourne, S VV & by S l. 34
From the Fourne to St. Matthews point, S S E l. 3
From thence to Fountenau or Founteynes, S & by E l. 5
From Ushant to the Sesmes a Sea-board it, S l. 7
From Fontenau to the west Penma ques, S E l. 7
From thence unto the Isle of Croy, E & by S l. 12
From the West Penma kes to Bell-Isle E S E l. 15
From thence to Heys somewhat more Easterly S E l. 12
From thence again in till within Piquilier, E & S l. 10
From thence again unto Croysil, E & by S l. 9
From Piquilier unto Heys, S & by VV l. 5
From Heys to the Killiats, E S E l. 10
From the Isle of Heys to Porthuis, S E & by E l. 12

From

From S. Martins Iland to the Burning Ile,	S and by E. l. 3.
From the Burning Ile to the Oyster bank,	S.S.E l. 3.
From St. Martins Ile to the Tower of Cordam,	S & by E l. 12.
From thence unto Bayone,	S.& N. l. 28.
From Bayone to Orio,	W.S.W. l. 5.
From Orio unto St. John de Luz,	E.S.E. l. 6.
From Cape de Pennas to Ribadeo	S.W. and by W. l. 12.
From Orio unto St. Andrew,	W. and by S. l. 10
From St. Andrew unto Cape de Pennas,	E. and W. l. 30
From Cape de Pennas to Ortegal.	W. and by W l. 20
From Ortegal unto Rebadeo,	E. l. 14
From Ortegal unto the Ile Cizaega,	S.W. and by W. l. 13
From Cizaega to Coronna,	E.S.E. l. 6.
From thence unto Cape Coriana,	W.S.W. l. 10.
From Coriana to Cape Finisterre.	S. and N. l. 3.
From Finisterre unto Bayone,	S.E. and by S. l. 14.
From Bayone unto Port de Port,	S.S.E. l. 18.
From Port de Port to Aveiro,	S. and N. l. 8.
From Aveiro to *Montega*,	S.S.W. l. 5.
From *Montega* unto Barlings,	S.W. l. 12.
From Barlings unto Roxende,	S. and by E. l. 12.
From Roxende unto St. Uves point,	S.E. and by S. l. 8.
From thence unto Cape of St. Vincent,	S. and N. l. 24.
From thence unto Pharo,	E. and W. l. 14.
From Pharo unto Lepe,	N.E. and by E. l. 12.
From Pharo to Saltees,	E.N.E. l. 18.
From Saltees to Chipiona,	S.E. l. 8.
From Chipiona, to Callis *Malo*,	S.E. l. 6.
From Calis unto the straight of Gibralter,	S.E. l. 8.
From Calis unto Cape de Cantin,	S.W. and by S. l. 60.
From Cape de Cantin to the Ile of *Madera*	W. l. 104.
From S. Vincent to *Madera*,	S.W. and by W. l. 115
From Roxende to *Madera*	S.W. l. 130
From Roxende to the Ile of Tercera,	W. l. 210.

The Courses of *England*, *Ireland*, and *Scotland*.

From Beckues unto Leith in Scotland S S W I. 28.
From Leith unto Barwick S S E I. 8
From Barwick unto the Holy Isle, E S E I. 4
From St. Abbes head to the Easterne end of Farne Iles S E I. 6
From the Iles of Farne to the Tees-mouth, S S E I. 16
From the River of Tees to Flambrough-head, S E & by E I. 14
From Flambrough-head to Blackney S E I. 18
From Blackney unto Winterton S E I 8
From Winterton unto Leistoff, S & by E I. 8
From Leistoffe unto Orford Haven, S I. 7
From Orford unto the Foreland, S S E I. 13
From the Foreland to Dover, S I. 5
From Dover to the Shingles or the Nesse point, S & W by W I. 7
From the Nesse point unto the Beach W S W I. 6
From the Beach to the Isle of Wight W & by S I. 15
From Wight unto Portland W & by S I. 10
From Portland to the Start point W S W I. 14
From the Start unto Ram-head point W N W I. 6
From Ramhead unto the Dodmans point V V S V V I. 8
From Dodmans to the Lizard point S V V & by W I. 6
From the Lizard to the Isles of Silly, V V I. 12
From the Lizard to the Lands-end V V N V V I. 8
From the Lands-end to the Isle of Lundy, N E I. 14
From thence unto the Holmes of Bristow, N E & by E I. 16
From thence unto the Isle of Caldy V V S V V I. 25
From thence to the Iles of Salteys, on the Coast of Ireland, V V N V V I. 20
From Salteys to Cape-Cleer V V S V V I. 25
From Cap-Clear to the Isle of Dorsey, V V I. 12
From the point of Dorsey to the Isle of Blakem, N N V V I. 16
From Blakem unto the Iles of Arrant, N N E I. 14
From the Iles of Arrant to Galwick, or the Gulfe in Ireland E N E I. 6

Of divers and sundry Courses over the Western Sea.

From the Texel on the Coast of Holland to Flambrough, VVNVVl 45

From Texel unto Winteeton in Norfolk, W.l.32.

From the Isle of Texel unto Leistoff:, W. and by S. l. 28

From the River of the *Maze* in South Holland unto Harwich, W.l.26.

From the said *Maze* to the Foreland of England, W. by S.l.25

From the *Marsdeep* in North Holland to the said Foreland, S. W.l. 36

From the said Marsdeep to Calice, W. & by S.l.38

From Dover unto Bulloign, S.E.l.8

From Bulloign unto the Beache, W.l.16

From the Beache to Deep in Normandy, S.E.l. 18

From Deep unto the Isle of Wight, E.S.E.l.28

From Wight to the *Seyne*-head or mouth, S.E.l.20

From the said River of Seyne to Portland W.N.W.l.30

From the Isle of Wight unto the Caskets S.W.& by S.l.14

From Garnsey unto St. Malo in Normandy, S.S.E.l.8.

From the Caskets to Portland, N.& by W.l.10

From the Caskets to the Start point, W.N.W.l.16

From the *Start* to the Sept-Iles in Normandy, S.S.E.l.24

From the Start, to St. Poul in Normandy, S.&, by W.l.22

From St. Poul to Portland, N.E.& by N.l.32

From the Fournes to Ramhead, N.N.E.l.28

From the *Start* point unto Ushant, S.W.& by S.l.32

From the Fournes to the Lizard, S.& N.l.22

From Ushant to the Isles of Silly, N.N.W.l.26

From the Sorlings to Milford Haven, N.& by E.l.25

From the Sorlings to Wexford in Ireland, N.N.W.l.34

From the Sorlings to Cape Cleer, N.W.l.42

From Cape Cleer to Cape Finisterre, S.& N.l.130

From the Lizard to Cape de Finisterre in Galizia, S.S.W.l.112

From Ushant unto the Isle of Cizarga in Galizia, S S W 1. 85
From Ushant to Laredo in Biskay S S E 1. 85
From the Seam Rocks to St. Sebastian, in Biskay Southeast and by S 3 leagues 10
From Ushant againe to Cape de Pennas in Biskay, S. and N 1. 70
From Belile unto Ortegal in Galizia, S W 1. 75
From St. Martins Isle to Ortegal, W S W 1. 85
From Ortegal to Cape de Corina S W and by W 1. 24
From Cape de Finisterre to the Isle of St. Michael, W S W 1. 185
From St. Michael to the Isle of Tercera, N W 1. 26
From Cape de Finisterre to the Isle of Madera S W & by W 1. 190
From Madera unto the great Isle of Canary, S E & by E 1. 60
From Cape Finisterre to Bayone in Galizia, S by E 1. 15.
From Cape de Finisterre to the Isle of Barling, S & N 1. 50
From the Barlings in Portugal to the Isle of Canary, S S W 1. 170
From the Isle of Madera to Calis Malis, E N E 1. 150
From Calis to Cape de Cantin, S W & by S 1. 65
From Cape de St. Vincent unto Cape de Cantin, S and N 1. 62
From Cape de St. Vincent unto the Isle of Madera, Southwest & by W 1. 120
From Roxand in Portugal, unto the Isle of Tercera, E & W 1. 210

The Courses of *Norway*, *Swethland*, and *East-Finland*.

From Schuytenis to the Vesteen, S and by E 1. 4
From Vesteen or Westone to the Jeddor, S S E 1. 4
From the Jeddor to the Vorsteen or Foritone S E 1. 5
From the Foritone to the Noes, E S E 1. 6
From the Noes unto Reperwicke, E N E 1. 8
From Reperwick to *Mardon*, N E 1. 10
From *Mardon* unto Jofferland N E 1. 8
From Jofferland to Langhesond, N N E 1. 1
From Langhesond to Ferderoer N E & by E 1. 6
From Ferderoer unto Soen water, N 1. 6

From

From Ferderoer unto Roeghe	NNE 1. 4
From Ferderoer unto Akersound,	ENE 1. 6
From Akersound to Maesterland,	SE & by E 1. 4
From Pater noster to Nydrinke,	SE 1. 8
From Nydrink to Waersberg	SE & by E 1. 4
From Waersberg to Swederoer	SSE 1. 6
From Swederoer unto Col	SSW 1. 3
From Col unto Lapland,	SE 1. 3
From Lapland unto Ween,	SSE 1. 2
From Ween to Darkeriffe	S & by E 1. 7
From Darkeriffe to Steeder,	S & by W 1. 4
From Steeden to the Northend of Bornholm,	E & by N 1. 15
From Bornholm unto Aano,	N & by W 1. 8
From Aano unto the Rockes,	NE 1. 8
From the Rockes untill within the Calmorsond	NNE 1. 10
From Calmorsond to the Swedish Ionck from	NNE 1. 8
From Ionck from to Landsoort,	NNE 1. 8
From thence untill before Durshaven,	NE & by E 1. 8
From the Stockhomes Shares to View of Abo,	NE & by N 1. 24
From View unto Lunt Utchares,	ENE 1. 28
From Udchares to the Ile of Puchuage,	E & by N 1. 30
From thence unto Somare.	E & W 1. 9
From Somere unto the Red-poole of Wiburg,	NE 1. 9
From the Red-hole unto Traleland,	NE & by N 1. 2
From thence unto Wiburg	Leagues 2

THere is a new Booke, called the *Pilots Sea-mirror*, which is a *Compendium* of the largest *Waggoner*, or the lightning *Sea-Coullumbe*; Containing all Distances or thwart Courses of the *Eastern*, *Northern*, and *Westerne* Navigation, with a generall Tide Table, for every day, and the full of the Moon exactly for eight years, also Courses and distances throughout the Streights. Printed for *George Herlock* at *Maggus Church Corner*, by *London* Bridge.

The Depth and Soundings, neer divers Provinces And first of *Gascoigne*, *Poictu*, and *Britaine*.

WIthout the Riber of Burdeax there is 14 fatham depth, but when you come within the sight of Cordam Tower 30 fatham.

Over against the Coasts of Poictu, 16 leagues without Oleron you have 35 fatham, but comming neer the land 8 leagues from the shore, you have 35 fatham; In the Channel between Porthus and Heys, it is 30 fatham, and as much in the Channel of Heys, as also between Heys and Belile, without the Channel is 35 fatham, but within 25: without Heys two kennings off, there is found 45 fatham.

Twenty two leagues Southward off Belile is 70 fatham, but 9 leagues from the Northwest point of that Iland, towards the Southwest is 60 fatham: and over against the mouth of Belile in 40 fatham depth, you shall see land. In your Course between Belile and the Seames, you must come no neerer then 50 or 45 fatham if you sail from Belile West and by North: when you are against Gloyland, you shall finde 60 fatham depth without, and within a Rock which stands off Gloyland to the Sea-wards, you have 40 fatham water: in 60 fatham depth without the West Penmarkes, you may sail Northwest by west without the Seames, but by night come no neerer then in 55 fatham, for the ground is grosse and red sand, and full of red flints: halfe a league West Southwest of the Seames is a ledge of Rocks, where you have seven fatham depth, but between the Seames and the Rock is 50 fatham.

In the Channel between the Seames and Ushant, is 55 fatham depth, the ground is grosse and red sand, with little round stones red and black: neer to Ushant is 45 fatham, but within it is of a variable depth: Southwest almost six leagues off Ushant, you have 70 fatham, and the ground is fine white sand, with little white shells, and other small things like needles, and then is

Ushant

Ushant East from you: but if the land be grosse and white, mingled with great and white shels, then it is Southeast to you: but if you doubt of these Grounds go Northerly, if your sound be deeper, then are you towards the Seames, but if not so deep, then are you in the Channel almost North of Ushant.

Between Ushant and Obverack, in the trade, it is 60 fatham depth, between Ushant and the Sorlings in the midst of the Channel there is 70 fatham, between the Seams and Ushant, in 70 fatham water, the ground is of little black stones easie to be broken and of yellow earth and clay: but if you finde red and hard sand, go Northward, till you happen on white sand mingled with long strokes, and then you are in the Channel.

If from Cizarga you saile North northeast in the Spanish seas toward Ushant, & finde your selfe in 80 fatham, you are 14 or 15 leagues off Ushant, but comming neerer you shall have 70 fatham water and be 10 leagues from Ushant, but if you find the ground to be yellow shels, and little black stones, then are you towards the Seames, therefore you must with the tide, bear off Northward: to shun Ushant untill you find white sand and things like needles, for such are the grounds of the Channel.

Betwixt Ushant and the Isle of Base when you sail at 4 fatham water, you are 4 leagues off the shore, but by night come no neerer then 25 fatham. When you are two leagues off Obverack, you shall find 25 fatham depth, but 8 leagues off the Sept-Isles you have 55 fatham.

A league without the Rocks of Obverack, there is a blind or bidden Rock: so that if you were to sail upon a boord between the Fourns and Obverack, come no neerer the blinde Rock than 40 fatham, but Eastward you may sail in 30 or 25 fatham.

If a ship sailing West S. W. and Southwest by W off Silly, at 80 fathom water, be found to be under 49 degrees, 15 minutes of Altitude, she is 26 leagues from Land, and must go East and by North, til she get 66 fatham water, for then she is in the Channel between Silly and Ushant, and then if she be bound for England, she must sail more Northward, and between the Lands-end and the Lizard, she shall have 55 fatham depth.

The-

The Soundings and Grounds between *Ireland*, *England* and *Normandy*.

THree Leagues without the Iles of Dorsey, neere Ireland, it is 45 fathom deep: In the Channel between Dorsey and Cape cleare, is 42 or 43 fathom, the Channel from Cape-cleare to Salcees, hath 45 fathom, but two leagues off Ireland it hath but Forty; between Salcees and Milford it is 44 fathom deep and between Lunday and Silly: is 38 fathom, In the mid-way between Silly and Milford is 44 fathom, but North of Silly 40 and 42, and neer England, by the Lands-end the Channel is of 50 fathom deep.

Comming from Cape Finisterre, saying. N. N. E, if you have 80 fathom, you are 20 leagues off the shore, and the ground is small black stones with great red sand: in the same course, when you have but 60 fathom, you are within 12 or 14 leagues off the shore, but shall not so soon kenne land, as you thinke for: you shall a great while have 60 fathom, being at the N. parts of the Channel about Silly: between Ushant and Silly, the Channel is 70 fathom, on the South side of Silly the ground is small red stones, and fine white sand: over against the Lizard and Falmouth four leagues from shore is 52 fathom: betwixt Foy and Plimouth sound, in the Channel nighest is 60 fathom between the Lizard and the Start, bear no neerer the shore than 35 fathom, you may cast Ancor in the Trade or Channel in 25 fathom, and so you shall lie within the Foreland stream: between Plymouth and the Sept-Isles, in the middest of the Channel 55 fathom, but foure leagues S S W off Plymouth, is but 35 fathom S S E. off the midland of the Start is 45 fathom, but from thence 5 or 6 leagues S E is 54 fathom: in the Channel between the Caskets and Portland is 40 fathom, a league N. off the Isle of Alderney, is a hole or pit 80 fathom deep, all the rest of the Channel between Portland and Aldernay, is of equal depth, viz. 40 fathom: when you are within kenning of Portland, your sounding is 34 fathom: and two leagues off Wight 36 fathom: also two leagues Eastward of Beachy, between Picardy and Wight, the Channel

in

to the midst is 38 fatham: between Winchelsey and Picardy is 24 fatham, the shoalds between the head called the Vrwensand hath but 3 fatham and an half, but on the Southside of it is 24 fatham: and in al the fair way between Zealand and Dover, it is 24 fatham deep

Depths of the North Sea from the Foreland.

IN the Channel from England, Foreland, and sands of Flanders, you have 24 fatham deep: but 3 leagues North West by West, off the Country of Zierrickze, called Bobrreck, it hath but four fatham deep without the shoald, the Channel of Zealand is 26 fatham N. W. off Harlem 8 or 9 miles within the Sea, there beginneth a shelf called De breede Verthier, reaching alongst the Coast of Holland, to the plaine of Ameland, where it endeth: Over against Harlem and Egmont is 13, 14, or 15, fatham, and the ground is full of Mase, mingled with black sand like Mustard-seed: the said shelf hath 15, 16, or 17 fatham, depth: Between Texel and Vlyland, where the ground is grosse red sand, 6 or 7 leagues from the shore, so there the shoald is narrower than it is toward the South end of the Channel: without the shoald between Zealand and Texel is 26 fatham deep, as far as the shoald which the Fishers call Dog-sand. In the Channel on England side over against Yarmouth is 35 fatham, but against Flambrough and Scarborough point 38 fatham, whereas the white shelf called Dog-sand beginneth reaching into the North Seas to the Channel of Helichland, this shoald (where it is within kenning of Flambrough point) hath but nine or ten fatham, but when in the same Sand you finde twelve fatham, then Texel is from you Southeast almost 30 leagues, but when you come to 16 fatham, then are you within 21 leagues South southeast of Vlyeland.

A ship that comes from the Risse, finding 18 fatham depth, on the aforesaid sand, is then 20 leagues South and by East of Vlyeland, but at 22 fatham you must then sail towards the Vlye, South and by West, and South-southwest, but if in this Channel of Helichland 14 or 16 fatham be found then you must sail

Southwest, and Southwest by South, and then you come to the Schelingh, but if in Hellichland Sound, you have 27 fatham, then are you altogether to the Eastward of it: between the Riff and the Doggersland, the Channel is 26 fatham: without the Channel Westward it is 32 fatham deep.

A ship that comes out of the English Straits, or out of Zealand, by bing at the Riffe 24 fatham, is from the Naes in Norway, 18 leagues North and by East, but having 20 fatham is but sixteen leagues from it North, and finding but 18 fatham is then 18 leag. off it North by West: The course from thence to the Holmes is 12 leagues North by East: from thence to the point of Schagens, is 18 leag. Northeast by E. there is a Rock of one fatham depth. Northeast, and Northeast by E. off the Holmes 2 leag. from shore.

Depths neer *Jutland* and *Ameland*.

IN the Sea without Jutland, a mile from Dodenbergh, is a bank called Reef-borne, stretching out eight leagues west by South, in some places but three fatham deep, and in some places may be sailed over, and become a Road for a Northwest, and a North wind in 20 fatham; From Ameland towards the Sea, the ground is grosse sand, red and black mingled with shels: thence Southward in 16 fatham sailing three houres, you shall come to the South Sea of Ameland, where the ground is fine sand with shells: North from Schelingh in 24 fatham, is fine white sand, and in 8 fatham white and black sand mingled, Vlyland, hath white sand with shells, and thin black sand in 16 fatham depth: From the West end of Vlyeland is great and red sand mingled with black like unto Mustard-seed: about six or seaven leagues from shore at the East end of Schelingh, to Sea-wards at 18 fatham, is fine white sand mingled with black, having in it things like needles. Over against Bork in the Western Emes at 17 or 18 fatham deep, land may be seen: the ground grosse grabelly sand: At 14 fatham may Ameland be hen'd, but Schelingh at 16, and Vlyeland, at 15 or 16 fatham water. At the North Hook of Texel, land may be seen at 16 fatham. Holland at 14 or 15. When you sail within the shoald called the Breduitthe in, which

which beginneth Northwest of Harlem, and stretcheth along the coast of Holland, to the West end of Vlyeland, it is 7 or 8 leagues from the shore.

Soundings and Grounds neer the *Schaw*.

A great league West by North from the Schaw is 35 fatham deep: North Northeast a great league off the corner of this point is 38 fatham, and when the point is Northeast from you, then you have 17 fatham. Between this point and Leson, the Channel is 20 fatham deep, and the ground like clay or dirt; Between Anhout and Waresbergh, in the midst of the Channel is 22 fatham water: Between Leson and Anhout, the ground is fine and stony: neer Waersbergh to a shoald of 17 fatham deep: Between Anhout and Col is another shoald of 17 fatham, where sometimes it is troublesome like a whirl-pool.

Depths of the Eastern Seas.

BEtween Oeland and Gothland, the soundings are unequall, sometimes of 20, sometimes of 23 fatham, the ground grosse, and black stony sand like Peale: when the South end of Oeland is 2 leagues from you westwards, ye have 27 fatham, where also you may gage water, but when the Chappel of Sudernoorden beareth West Northwest of you, then have you 31 fatham and ground fit to gage water. Over against the Rock in the fair way is 52 fatham, and a Clay ground, but fit for gaging: Between the greater and lesser Carl is 14 fatham, under which is a safe road for ships, there is a shoald between Houghbergh and Ostergard 24 fatham depth, the ground great sand, but hardly from thence can you ken Gothland out of the top: there is also to the Eastward another shoald of 36 fatham, which when you are past, you have more than 40 fatham water: when the point of Right is three leagues Southeast from you, then have you 30 fatham, but when it is from you halfe a league South southeast, you have but 15 fatham, and the ground is white sand: but when it beareth West a small league from you, then you shall find 16

fatham: Over against Heel halfe a league from the shore it is almost 3 fatham deep: the road for Ships at *Heel* hath 25 fatham depth: Between Moan and *Falsterbourn* is 14 fatham depth: Between *Stead* and Fasterbourn in the very Channel, is but 12 fatham deep: neer Falsterbourn it is full of shoalds, but neer Stead you have 13 fatham water: between Dankerff and Southoimen, which is more shoaldy, there is 5 fatham wanting two foot, from thence towards the Sound it is something deeper than 6, 7, 8, 9, or 10 fatham.

A Note of certain and most dangerous places in the Sea.

THe principallest and most perillous of all is the Mael-stream, well or Slurp, called the Mousk-stream: which lieth on the backside of Norway in 68 degrees, on the Northside of an Island or Rock called Weeray. This well draweth the water unto it self, during the whole flood, (which is the space of 6 hours, and 12 minutes) with such an indraught and force, and with such a noise through the tumbling and falling of the waves and streams one upon the other, that it is rather to wonder at, than to write of. So that during that time, within the space of more than two leagues, round about the Rock of Mousk (under which that water floweth) no ship or other vessel may come neer, for they should to their utter destruction be drawn in to it, and swallowed up; but all the time of the Ebbe, the water is so strongly cast up again, that no kinde of substance or Metal, how heavie soever it be, can there sink: So that our Northern Fishers at that time with their Jollen or fishing Boats take many and strange formed Fishes which they draw into their Boats with Hooks and Lines, which they have ready laid for that purpose: for that during the Ebb, they cannot return into the Gulph, nor get under water by any means.

The Northern people that inhabit about those Rocks, do think that stream passeth away underneath a part of Norway, under the North bottom in East Finland, because that in that place there is likewise such a Meal-stream, (though not altogether

so

so strong nor dangerous) where the like fishes are taken, and the water is in like sort troublesome, as it is underneath and above the Rock of *Mousk*.

Whereupon many experienced Pilots do call the said Slorp, The Navel of the Sea, which causes the courses of the Ebbs and Flouds about all the Lands that are on the Northside of the Equinoctial, as the most convenient place for that purpose, to spread the waters South, North, East and West; that is to say, Northerly towards the Pole Artick, South Easterly on the backside of Russia and Tartaria, and toward the straight of the great South Sea called *Mar del Zur*, wherein the Spirits of Islands (called Moluccas, neer the Equinoctiall) are lying Southward, the North Sea of these Low-Countries: As also on the backside of Scotland and Ireland, towards the Spanish and Atlantick Seas, and towards the Northwest beyond Iseland, towards Frobishers Straights, where it is thought the way unto Catay may be found

There are moreover to be feared upon the Western Seas, very dangerous Streams and Gulphs, as in the Race of Portland, where oftentimes happeneth such turning and rumbling of Waves and Streams, that the ships which pass that way are many times in great peril.

Moreover, the Race of Branquett, between Normandy, and the Iles of Alderney, roareth and rageth, and so dangerously, that many Ship fall therein head-long to deep, that suddenly they are swallowed up, and sunk to the very bottom.

The race of Fourmey is more dangerous than all these, wherein many small Vessels and Barks of Britany, and of other Countries, are suddenly deboured and cast away: and the entrance of the Garrone, called the river of Burdeaux, between the Towers of Cordam, and the Southern and Northern Isles is likewise very perillous, and many Ships do often perish there, if the Pilots be not skilfull and well acquainted with the place,

And therefore being the more full of danger, it behoveth each Pilot and Master to have especial knowledge thereof, and great care to prevent the danger that may ensue unto them thereby.

The

The four Terms.

Hillary Term, begins January 23, and ends February 12.
Easter Term, begins 17 daies after Easter day, and ends the Munday before Whitsunday.
Trinity Term, begins next Friday after Trinity-Sunday, and ends on Wednesday 19 daies after.
Michaelmas Term, begins the 23 of October, and ends November 28.

A brief Explication of the several parts of this following *Kalender* or *Ephemerides*.

THe first Page contains an Almanack for 24 years to come, shewing the Prime, Epact, Sunday-letter, Leap-year, and all the principall moveable Feasts.

The following leaves shew the 12 *Moneths* of the Year in their order, and each Moneth is divided into severall Columns or spaces, which are alike in all the moneths.

In the first, is set down the Prime.

In the second, is set down the houre and minute of the New Moon, for 19 years following.

In the third, the day of the moneth.

In the fourth, the Sunday-letter, whereby you may know the day of the Week.

In the fifth, is set down the names of the fixed Feasts, and other daies of note, and in the void place between them is set down the time of the Sun rising and setting at *London*.

Then followeth four Sections, each one consisting of three Columns, where is set down the longitude and Declination of the Sun in the Meridian of *London*, for the years 1661, 1662, 1663, 1664.

Unto this *Kalender*, is added the *Gregorian* or Forreign Account for every moneth.

Here-

Hereafter followeth a most excellent, necessary and compendious Kalender, shewing the Prime, Epact, Dominical Letters, Leap-yeers, and moveable Feasts, for 24 years, inclusively comprehending therewith the true day and hour of the Moons Conjunction, or Change, for 19 years to come, with the true place of the Sun and his Declination from the Equinoctial, both Northwards and Southwards upon every degree thereof, through the twelve moneths of the year.

				The English Account.			Forreign Account.		
Years of our Lord	Prime	Epact	Sunday Letter.	First Sunday in Lent	Easter day.	Whitsunday	Easter day.	Whitsunday	Sooner then ours
1657	5	25	D	Feb. 15	Mar. 29	May, 17	Apr. 1	May, 20	1 Weeks
1658	6	6	C	Febr. 28	Apr. 11	May 30	21	June, 9	0
1659	7	17	B	20	3	22	13	June, 1	0
1660	8	28	A G	Mar. 11	22	June 10	Mar. 28	May, 16	5
1661	9	9	F	Marc. 3	Apr. 14	June, 2	Apr. 17	June, 5	1 Weeks
1662	10	20	E	Febr. 16	Mar. 30	May, 18	9	May, 28	0
1663	11	1	D	Marc. 8	Apr. 19	June, 7	Mar. 25	May, 13	5
1664	12	12	C B	Febr. 28	Apr. 10	May, 29	Apr. 13	June, 1	1
1665	13	23	A	12	Mar. 26	May, 14	April 5	May, 24	0 Weeks
1666	14	4	G	Marc. 4	Apr. 15	June, 3	25	June, 13	0
1667	15	15	F	Febr. 24	Apr. 7	May 26	10	May, 29	1
1668	16	26	E D	9	Mar. 22	10	1	May, 20	0
1669	17	7	C	28	Apr. 11	May, 30	Apr. 21	June, 9	0 Weeks
1670	18	18	B	Febr. 20	April 3	22		May, 25	1
1671	19	29	A	Mar. 12	23	June, 11	Mar. 29	May, 17	5
1672	1	11	G F	Febr. 25	7	May, 26	Apr. 17	June, 5	0
1673	2	22	E	Febr. 17	Mar. 30	May, 19	Apr. 2	May, 21	1 Weeks
1674	3	3	D	Marc. 8	Apr. 19	June, 7	22	June, 10	1
1675	4	14	C	Febr. 21	4	May, 23	14	June, 2	0
1676	5	25	B A	13	Mar. 26	14	5	May, 24	0
1677	6	6	G	Marc. 4	Apr. 15	June, 3	Apr. 18	June, 6	1 Weeks
1678	7	17	F	Febr. 17	Mar. 31	May, 19	10	May, 29	0
1679	8	28	E	Mar. 9	Apr. 20	June, 8	Mar. 26	May, 14	5
1680	9	9	D C	Febr. 28	11	May, 30	Apr. 21	June, 9	0

January hath xxxj. dayes,

The Prime.	The time of the New Moon. H. M.	Moneth-day.	Week-day.	The English Kalender.	Suns rising H. M.	Suns setting H. M.	1591.	First year, ⊙ in Capricorn Suns Long. D. M.	Suns Decli. D. M.	Diff. of Decli.	1592.	Second Yeare ⊙ in Capricorn Suns Long. D. M.	Suns Decli. D. M.
8	23 24	1	A	N. years day			1	21 59	21 43	10	1	21 45	21 46
		2	B		7 59	4 1	2	23 1	21 33		2	22 46	21 36
16	12 6	3	C		7 58	4 2	3	24 2	21 23	11	3	23 47	21 26
5	8 14	4	D		7 57	4 3	4	25 3	21 12		4	24 48	21 15
13	20 56	5	E		7 56	4 4	5	26 4	20 1	12	5	25 50	21 4
		6	F	Twelfth da			6	27 6	20 49		6	26 51	20 52
2	9 37	7	G		7 53	4 7	7	28 7	20 37	13	7	27 52	20 40
		8	A	Lucian	4 8		8	29 8	20 24		8	28 53	20 27
10	5 46	9	B	Sunin Aqua			9	≈ 9	20 11	13	9	29 54	20 14
18	18 27	10	C		7 49	4 11	10	1 10	19 58		10	≈ 55	20 1
		11	D		7 48	4 12	11	2 11	19 45	14	11	1 57	19 48
7	14 36	12	E		7 46	4 14	12	3 12	19 31		12	2 58	19 34
		13	F	Hillary	16		13	4 14	19 16	15	13	3 59	19 19
15	3 17	14	G		7 43	4 17	14	5 15	19 1		14	5 0	19 5
4	15 58	15	A		7 41	4 19	15	6 16	18 46	15	15	6 1	18 50
		16	B		7 40	4 20	16	7 17	18 31		16	7 2	18 35
12	12 7	17	C		7 39	4 21	17	8 18	18 15	16	17	8 3	18 19
		18	D		7 37	4 23	18	9 19	17 59		18	9 4	18 3
1	0 48	19	E		7 35	4 25	19	10 20	17 43	17	19	10 5	17 47
9	0 0	20	F	Fabian	4 26		20	11 21	17 26		20	11 6	17 30
17	9 38	21	G	Agnes	4 28		21	12 21	17 10	18	21	12 7	17 14
		22	A	Vincẽ	4 30		22	13 22	16 52		22	13 8	16 56
6	5 47	23	B		7 29	4 31	23	14 23	16 35	18	23	14 9	16 39
14	18 28	24	C		7 27	4 33	24	15 24	16 17		24	15 9	16 21
		25	D	Conu. Paul			25	16 25	15 59	19	25	16 10	16 3
3	7 10	26	E		7 23	4 37	26	17 26	15 40		26	17 11	15 44
		27	F		7 22	4 38	27	18 26	15 22	19	27	18 12	15 26
11	3 18	28	G		7 20	4 40	28	19 27	15 3		28	19 13	15 7
19	16 0	29	A		7 18	4 42	29	20 28	14 43	19	29	20 13	14 48
		30	B		7 16	4 44	30	21 29	14 24		30	21 14	14 28
8	12 8	31	C		7 14	4 46	31	22 29	14 4	20	31	22 15	14 9

Third year, ☉ in Capricorn		Diff. of Decl.	Leap-year, ☉ in Capricorn		
1692. Suns Long.	Suns Decl.		1694. Suns Ilong.	Suns Decli.	
D. M.	D. M.		D. M.	D. M.	
1 21 30	21 4	10	1 21 15	21 5	
2 22 31	21 3		2 22 16	21 4	
3 23 32	21 2	10	3 23 17	21 3	
4 24 33	21 1		4 24 19	21 2	
5 25 35	21 0	12	5 25 20	21 0	
6 26 36	20 55		6 26 21	20 58	
7 27 37	20 43	12	7 27 22	20 46	
8 28 38	20 31		8 28 23	20 34	
9 29 39	20 18	13	9 29 25	20 21	
10 ♒ 41	20 5		10 ♒ 26	20 8	
11 1 42	19 51	14	11 1 27	19 55	
12 2 43	19 37		12 2 28	19 41	
13 3 44	19 23	14	13 3 29	19 27	
14 4 45	19 9		14 4 30	19 13	
15 5 46	18 54	15	15 5 31	18 58	
16 6 47	18 39		16 6 32	18 42	
17 7 48	18 23	16	17 7 33	18 28	
18 8 49	18 7		18 8 34	18 17	
19 9 50	17 51	16	19 9 35	17 55	
20 10 51	17 35		20 10 36	17 39	
21 11 52	17 18	17	21 11 37	17 2	
22 12 53	17 1		22 12 38	17 5	
23 13 54	16 43	18	23 13 39	16 47	
24 14 55	16 25		24 14 40	16 30	
25 15 56	16 7	18	25 15 41	16 17	
26 16 56	15 49		26 16 42	15 53	
27 17 57	15 31	19	27 17 42	15 35	
28 18 58	15 12		28 18 43	15 16	
29 19 59	14 53	20	29 19 44	14 57	
30 20 59	14 33		30 20 45	14 38	
31 21 00	14 14		31 21 45	14 19	

South Declination decreasing.

THE Forreign Account. And The Southing of the Stars just at midnight.

11	D	Each star set down just against the day wherein it comes to the South at midnight; By which you may see what stars are in observation, and at what time of the night. For the stars before, come to the South so much before midnight, and the stars after, so much after midnight as they are distant in dayes; allowing one hour for 15 dayes, and 2 hours for a moneth.
12	E	
13	F	
14	G	
15	A	
16	B	
17	C	
18	D	
19	E	
20	F	
21	G	
22	A	
23	B	
24	C	
25	D	Conversion of Paul.
26	E	
27	F	South Arme of the Crab. (13.8N.
28	G	
29	A	
30	B	
31	C	
1	D	FEBRUARY.
2	E	Purification of Mary.
3	F	Hydra's Heart 7, 12 S.
4	G	
5	A	
6	B	The Figures following each star, shews the degrees and minutes of Declination, N, North, So, South
7	C	
8	D	
9	E	
10	F	

The Prime	The time of the New Moon. H. M.	Week-day. Moneth-day.	The English Kalender.	Suns Rising H. M.	Suns Setting H. M.	First year ☉ in Aquarius, 1691. Suns Long. D. M.	Suns Decli. D. M.	Diff. of Decli.	Second year ☉ in Aquarius. 1692. Suns Longi. D. M.	Suns Decl D M.
		1 ♑		7 12	4 48	1 23 30	13 44	20	1 23 15	13 49
16	0 50	2 ♑	Purif. Mar.			2 24 31	13 24		2 24 16	13 29
5	13 31	3 ♑		7 9	4 51	3 25 31	13 4	20	3 25 17	13 9
23	9 40	4 ♒		7 7	4 53	4 26 32	12 43		4 26 17	12 48
2	22 21	5 ♒	Agat.	4 55		5 27 32	12 22	21	5 27 18	12 27
		6 ♒		7 3	4 57	6 28 33	12 1		6 28 18	12 6
10	18 30	7 ♓		7 1	4 59	7 29 33	11 40	21	7 29 19	11 45
		8 ♓	Sun in Pisc.			8 ♈ 34	11 19		8 ♈ 19	11 24
18	7 12	9 ♓		6 57	5 3	9 1 34	10 57	22	9 1 19	11 2
		10 ♈		6 55	5 5	10 2 34	10 36		10 2 20	10 41
7	3 20	11 ♈		6 53	5 7	11 3 35	10 14	22	11 3 20	10 19
15	16 01	12 ♈		6 51	5 9	12 4 35	9 53		12 4 20	9 57
		13 ♉		6 49	5 11	13 5 35	9 30	23	13 5 21	9 35
4	4 42	14 ♉	Valentine		12	14 6 36	9 7		14 6 21	9 13
		15 ♉		6 46	5 14	15 7 36	8 45	23	15 7 21	8 51
12	00 50	16 ♉		6 44	5 16	16 8 36	8 22		16 8 21	8 28
1	13 32	17 ♊		6 42	5 18	17 9 36	8 0	23	17 9 21	8 6
9	9 41	18 ♊		6 40	5 20	18 10 36	7 37		18 10 22	7 43
17	22 22	19 ♊		6 33	5 22	19 11 36	7 14	23	19 11 22	7 20
		20 ♊		6 36	5 24	20 12 36	6 51		20 12 22	6 57
6	18 31	21 ♋		6 34	5 26	21 13 36	6 28	23	21 13 22	6 34
		22 ♋		6 32	5 28	22 14 36	6 5		22 14 22	6 11
14	7 12	23 ♋		6 30	5 30	23 15 36	5 42	23	23 15 22	5 48
3	19 54	24 ♋	Matthias			24 16 36	5 18		24 16 22	5 24
		25 ♌		6 26	5 34	25 17 36	4 55	23	25 17 21	5 1
11	16 2	26 ♌		6 24	5 36	26 18 36	4 32		26 18 21	4 38
		27 ♌		6 22	5 38	27 19 36	4 8	23	27 19 21	4 14
19	4 44	28 ♌		6 20	5 40	28 20 35	3 45		28 20 21	3 51

When it is Leap-year *February* hath 29 dayes, and then St. *Matthias* is upon the 25 day.

Third year, ☉ in Aquaries				Diff. of Decli.	Leap-year, ☉ in Aquaries				South Declination
1663	Suns Long		Suns Decli.		1664	Suns Long.		Suns Decli.	
	D.	M.	D. M.			D.	M.	D. M	
1	23	1	13 54	2c	1	22	46	13 59	
2	24	1	13 34		2	23	47	13 39	
3	25	2	13 15	2c	3	24	47	13 19	
4	26	2	12 53		4	25	48	12 58	
5	27	3	12 53	21	5	26	48	12 38	
6	28	3	12 12		6	27	49	12 17	
7	29	4	11 51	21	7	28	49	11 56	
8	♓	4	11 30		8	29	50	11 34	
9	1	5	11 8	22	9	♓	50	11 13	
10	2	5	10 46		10	1	51	10 51	
11	3	6	10 24	22	11	2	51	10 30	
12	4	6	10 3		12	3	51	10 8	
13	5	6	9 41	22	13	4	52	9 46	
14	6	6	9 19		14	5	52	9 24	
15	7	7	8 56	23	15	6	52	9 1	
16	8	7	8 33		16	7	52	8 39	
17	9	7	8 11	23	17	8	52	8 17	
18	10	7	7 48		18	9	53	7 54	
19	11	7	7 25	23	19	10	53	7 31	
20	12	7	7 3		20	11	53	7 9	
21	13	7	6 40	23	21	12	53	6 45	
22	14	7	6 16		22	13	53	6 22	
23	15	7	5 53	23	23	14	53	5 59	
24	16	7	5 30		24	15	53	5 35	
25	17	7	5 6	23	25	16	53	5 12	
26	18	7	4 43		26	17	52	4 49	
27	19	7	4 19	23	27	18	52	4 25	
28	20	7	3 56		28	19	52	4 2	
					29	20	52	3 38	

THE Forreign Account. And The Southing of the Stars just at midnight.

11	☉	
12	♌	
13	♍	Lions heart 13. 36 N.
14	♎	
15	♏	Lions neck 25. 5 N.
16	♐	
17	♑	
18	♒	
19	♓	
20	♈	
21	♉	
22	♊	
23	♋	
24	♌	Matthias Apostle.
25	♍	
26	♎	G. Bears side 58. 12 N
27	♏	G. Bears back 63. 95 N
28	♐	
1	♑	MARCH.
2	♒	
3	♓	Lions back 22. 22 N.
4	♈	
5	♉	
6	♊	
7	♋	
8	♌	
9	♍	
10	♎	

The Prime.	The time of the New Moon. H. M.	Week-day. Month-day.		The English Kalender.	Suns Rising H. M.	Suns setting H. M.	First year, ☉ in Pisces 1661. Suns Long. D. M.	Suns Decli. D. M.	Diff. of Decli.	Second year, ☉ in Pisces 1662. Suns Longi. D. M.	Suns Decl. D. M.
8	0 52	1	D	David	5 42		1 21 35	3 31	24	1 21 21	3 27
16	13 34	2	E	6 16	5 44		2 22 35	2 57		2 22 20	3 3
		3	F	6 14	5 46		3 23 34	2 34	24	3 23 20	2 40
5	2 15	4	G	6 12	5 48		4 24 34	2 10		4 24 19	2 16
13	12 24	5	A	6 10	5 50		5 25 33	1 47	24	5 25 19	1 52
		6	B	6 8	5 52		6 26 33	1 23		6 26 18	1 29
2	11 5	7	C	6 6	5 54		7 27 32	0 59	24	7 27 18	1 5
		8	D	6 4	5 56		8 28 32	0 35		8 28 18	0 41
10	7 14	9	E	6 2	5 58		9 29 31	0 12	24	9 29 17	* 18
		10	F	Sun in	♈		10 ♈ 31	* 12		10 ♈ 16	0 6
18	3 23	11	G	Gregory	2		11 1 30	0 36	24	11 1 16	0 30
7	16 4	12	A	5 56	6 4		12 2 30	1 0		12 2 15	0 54
		13	B	5 54	6 6		13 3 29	1 23	24	13 3 14	1 18
15	4 45	14	C	5 52	6 8		14 4 28	1 47		14 4 14	1 41
4	17 26	15	D	5 50	6 10		15 5 27	2 10	24	15 5 13	2 5
12	13 35	16	E	5 48	6 12		16 6 26	2 34		16 6 12	2 29
		17	F	5 46	6 14		17 7 25	2 57	24	17 7 11	3 52
21	2 16	18	G	Edward	16		18 8 24	3 21		18 8 10	3 16
9	22 25	19	A	5 42	6 18		19 9 23	3 44	23	19 9 9	3 39
		20	B	Benidict	20		20 10 22	4 7		20 10 8	4 2
17	11 6	21	C	5 38	6 22		21 11 21	4 30	23	21 11 7	4 25
		22	D	5 36	6 24		22 12 20	4 54		22 12 6	4 48
6	7 15	23	E	5 34	6 26		23 13 19	5 17	23	23 13 5	5 11
14	19 56	24	F	5 32	6 28		24 14 18	5 40		24 14 4	5 34
		25	G	Annun	☉		25 15 17	6 3	23	25 15 3	5 57
3	8 18	26	A	5 28	6 32		26 16 16	6 25		26 16 2	6 19
		27	B	5 26	6 34		27 17 15	6 48	23	27 17 1	6 42
12	4 46	28	C	5 24	6 36		28 18 14	7 11		28 18 0	7 5
19	17 28	29	D	5 22	6 38		29 19 12	7 33	23	29 18 58	7 27
8	13 37	30	E	5 20	6 40		30 20 11	7 55		30 19 57	7 49
		31	F	5 18	6 42		31 21 10	8 17		31 20 55	8 11

Third year, ☉ in Pisces					Diff. of Decli.	Leap-year, ☉ in Pisces							
1663.	Suns Long. D.	M.	Suns Decli D.	M.		1664	Suns Long. D.	M.	Suns Decli D.	M.			THE Forreign Account. And The Southing of the Stars just at Midnight.
1	21	6	3	33	24	1	21	51	3	15	11	G	
2	22	6	3	9		2	22	51	2	51	12	A	Lions tia l16.28 N.
3	23	5	2	45	24	3	23	51	2	27	13	B	Great Bears thigh. 55.
4	24	5	2	21		4	24	50	2	4	14	C	(36.N.
5	25	5	1	58	24	5	25	50	1	40	15	D	
6	26	4	1	34		6	26	49	1	16	16	E	
7	27	4	1	10	24	7	27	49	0	52	17	F	
8	28	3	0	47		8	28	48	0	29	18	G	
9	29	3	0	23	24	9	29	48	0	05	19	A	
10	♈	2	*	01		10	♈	47	*	19	20	B	
11	1	1	0	24	24	11	1	47	0	43	21	C	
12	2	1	0	48		12	2	46	1	06	22	D	
13	3	0	1	12	24	13	3	45	1	30	23	E	
14	3	59	1	35		14	4	44	1	53	24	F	
15	4	59	1	59	24	15	5	44	2	17	25	G	Annunciation of Mary
16	5	58	2	23		16	6	43	2	41	26	A	
17	6	57	2	46	24	17	7	42	3	04	27	B	
18	7	56	3	10		18	8	41	3	27	28	C	
19	8	55	3	33	23	19	9	40	3	51	29	D	
20	9	54	3	56		20	10	39	4	14	30	E	First in Gr. Bears tail.
21	10	53	4	19	23	21	11	38	4	37	31	F	(57.50 N,
22	11	52	4	43		22	12	37	5	00	1	G	*APRIL.*
23	12	51	5	06	23	23	13	36	5	23	2	A	
24	13	50	5	29		24	14	35	5	46	3	B	
25	14	49	5	52	23	25	15	34	6	09	4	C	
26	15	48	6	14		26	16	32	6	31	5	D	
27	16	47	6	37	23	27	17	31	6	54	6	E	(9.21.S,
28	17	45	7	00		28	18	30	7	17	7	F	Virgins Spike, Acimon.
29	18	44	7	22	22	29	19	29	7	39	8	G	Second in Gr at Bears
30	19	43	7	44		30	20	27	8	1	9	A	(tail 56,44,N,
31	20	41	8	06		31	21	26	8	23	10	B	

South Declination. North Declination increasing.

April hath xxx. dayes,

The Prime me.	The time of the New Moon. H.	M.	Moneth day.	Week day.	The English Kalender. Suns rising H. M.	Suns setting H. M.	1661. First year, ⊙ in Aries Suns Long. D. M.	Suns Decli. D. M.	Diff. of Decli	1662. Second Yeare ⊙ in Aries Suns Long D. M	Suns Decli D. M
16	2	18	1	G	5 16	6 44	1 22 8	8 39	22	1 21 54	8 34
5	15	0	2	A	5 14	6 46	2 23 7	9 1		2 22 53	8 56
			3	B	5 12	6 48	3 24 5	9 23	22	3 23 51	9 17
13	11	8	4	C	Ambrose	50	4 25 4	9 44		4 24 50	9 39
2	23	49	5	D	5 8	6 52	5 26 2	10 6	21	5 25 48	10 1
			6	E	5 6	6 54	6 27 0	10 27		6 26 47	10 22
10	20	00	7	F	5 4	6 56	7 27 59	10 48	21	7 27 45	10 43
			8	G	5 3	6 57	8 28 58	11 9		8 28 43	11 4
18	16	7	9	A	Sun in Taur.		9 29 56	11 30	20	9 29 42	11 25
			10	B	5 0	7 0	10 ♉ 54	11 50		10 ♉ 40	11 45
7	4	18	11	C	4 58	7 2	11 1 52	12 10	20	11 1 38	12 5
15	17	29	12	D	4 56	7 4	12 2 51	12 30		12 2 37	12 26
			13	E	4 54	7 6	13 3 49	12 50	20	13 3 35	12 46
4	6	10	14	F	4 52	7 8	14 4 47	13 9		14 4 33	13 5
12	2	19	15	G	4 50	7 10	15 5 45	13 29	19	15 5 31	13 25
1	15	0	16	A	4 49	7 11	16 6 43	13 49		16 6 29	13 44
			17	B	4 47	7 13	17 7 41	14 8	19	17 7 27	14 3
9	11	9	18	C	4 45	7 15	18 8 39	14 26		18 8 25	14 22
			19	D	4 43	7 17	19 9 37	14 45	18	19 9 23	14 41
17	00	00	20	E	4 41	7 19	20 10 35	15 3		20 10 21	14 59
6	20	00	21	F	4 40	7 20	21 11 33	15 21	18	21 11 19	15 17
			22	G	4 38	7 22	22 12 31	15 39		22 12 17	15 35
14	8	40	23	A	Georg	7 24	23 13 29	15 57	17	23 13 15	15 53
3	21	2	24	B	4 35	7 25	24 14 27	16 14		24 14 13	16 10
			25	C	Mark Eva.		25 15 25	16 31	17	25 15 11	16 27
11	17	31	26	D	4 31	7 29	26 16 23	16 48		26 16 9	16 44
			27	E	4 29	7 31	27 17 21	17 5	16	27 17 7	17 1
19	6	12	28	F	4 28	7 32	28 18 19	17 21		28 18 5	17 17
8	2	22	29	G	4 26	7 34	29 19 16	17 27	16	29 19 2	17 33
16	15	2	30	A	4 25	7 35	30 20 14	17 52		30 20 0	17 49

Third year, ☉ in Aries			Diff. of Decli	Leap-year, ☉ in Aries			North Declination.	THE Forreign Account. And The Southing of the Stars just at Midnight.		
1663.	Suns Long. D.M.	Suns Decli D.M.		1664	Suns Long. D.M.	Suns Decli D.M.				
1	21 40	08 29	22	1	22 24	8 45		11	☾	
2	22 39	08 51		2	23 23	9 7		12	☿	
3	23 37	09 12	22	3	24 22	9 29		13	♀	
4	24 36	09 34		4	25 20	9 50		14	☉	
5	25 34	09 56	21	5	26 18	10 11		15	♂	Third in G. Bears tail,
6	26 33	10 17		6	27 17	10 33		16	♃	(51.3. N.
7	27 31	10 38	21	7	28 15	10 54		17	♄	
8	28 29	10 59		8	29 14	11 15		18	☾	Centaur's shoulder 35.
9	29 28	11 20	20	9	♉ 12	11 35		19	☿	(16 S.
10	♉ 26	11 40		10	1 10	11 55		20	♀	
11	1 24	12 00	20	11	2 9	12 16		21	☉	
12	2 23	12 21		12	3 7	12 36		22	♂	Arcturus 21.1 N.
13	3 21	12 41	20	13	4 5	12 56		23	♃	
14	4 19	13 00		14	5 3	13 15		24	♄	
15	5 17	13 20	19	15	6 1	13 35		25	☾	Mark Evangelist.
16	6 15	13 39		16	6 59	13 54		26	☿	
17	7 13	13 58	19	17	7 58	14 13		27	♀	
18	8 11	14 17		18	8 56	14 32		28	☉	
19	9 10	14 36	18	19	9 54	14 50		29	♂	
20	10 8	14 55		20	10 52	15 8		30	♃	South Ballance 14. 34S.
21	11 6	15 13	18	21	11 50	15 26		1	♄	MAY.
22	12 4	15 31		22	12 47	15 44		2	☾	
23	13 2	15 49	17	23	13 45	16 2		3	☿	
24	14 0	16 06		24	14 43	16 19		4	♀	
25	14 57	16 23	17	25	15 41	16 36		5	☉	
26	15 55	16 40		26	16 39	16 53		6	♂	(38 N.
27	16 53	16 57	17	27	17 37	17 9		7	♃	Formost Guard 7S
28	17 51	17 13		28	18 35	17 25		8	♄	North Ballance 8. 5 S.
29	18 48	17 29	16	29	19 32	17 41		9	☾	
30	19 46	17 45		30	20 30	17 57		10	☿	

May hath xxxj. dayes,

The Prime.	The time of the New Moon. H. M.	Moneth-day.	Week-day.	The English Kalender. Suns rising H. M.	Suns setting H. M.	First year, ⊙ in Taurus 1691. Suns Long. D. M.	Suns Decli. D. M.	Diff. of Decli.	Second Teare ⊙ in Taurus 1692. Suns Long D. M.	Suns Decli D. M.
		1	B	Phil & Ja		1 21 12	18 8	15	1 20 58	18 4
5	3 43	2	C	4 21	7 39	2 22 9	18 23		2 21 56	18 19
		3	D	Inven of C		3 23 7	18 37	14	3 22 53	18 34
13	0 0	4	E	4 18	7 42	4 24 5	18 52		4 23 51	18 49
2	12 33	5	F	4 16	7 44	5 25 2	19 06	14	5 24 48	19 3
		6	G	Jo Portlat		6 26 0	19 20		6 25 46	19 17
10	8 42	7	A	4 14	7 46	7 26 58	19 33	13	7 26 44	19 30
		8	B	4 13	7 47	8 27 55	19 46		8 27 41	19 43
18	4 51	9	C	4 11	7 49	9 28 53	19 59	13	9 28 39	19 56
7	17 32	10	D	Sun in Gem		10 29 50	20 12		10 29 36	20 9
		11	E	4 8	7 52	11 ♊ 48	20 24	12	11 ♊ 34	20 21
15	6 13	12	F	4 7	7 53	12 1 45	20 36		12 1 31	20 33
4	18 54	13	G	4 6	7 54	13 2 43	20 47	11	13 2 29	20 44
12	15 3	14	A	4 5	7 55	14 3 40	20 58		14 3 26	20 56
		15	B	4 4	7 56	15 4 37	21 9	10	15 4 24	21 7
1	3 44	16	C	4 3	7 57	16 5 35	21 19		16 5 21	21 17
		17	D	4 2	7 58	17 6 32	21 29	10	17 6 18	21 27
9	0 0	18	E	4 1	7 59	18 7 30	21 39		18 7 16	21 37
17	12 35	19	F	Dunstan o		19 8 27	21 48	9	19 8 13	21 46
		20	G	3 59	8 1	20 9 24	21 57		20 9 10	21 55
6	8 43	21	A	3 57	8 3	21 10 22	22 5	8	21 10 8	22 3
14	21 25	22	B	3 56	8 4	22 11 19	22 13		22 11 5	22 11
		23	C	3 55	8 5	23 12 16	22 21	7	23 12 2	22 19
3	9 46	24	D	3 55	8 5	24 13 13	22 28		24 13 0	22 27
		25	E	3 54	8 6	25 14 11	22 35	7	25 13 57	22 34
11	6 15	26	F	Augustin	7	26 15 8	22 42		26 14 54	22 40
19	18 56	27	G	3 52	8 8	27 16 5	22 48	6	27 15 51	22 46
8	15 5	28	A	3 52	8 8	28 17 2	22 54		28 16 49	22 52
		29	B	3 51	8 9	29 18 0	22 59	5	29 17 46	22 58
16	3 46	30	C	3 50	8 10	30 18 57	23 4		30 18 43	23 3
5	16 27	31	D	3 50	8 00	31 19 54	23 9		31 19 40	23 8

Third year, ☉ in Taurus			Diff. of Decli.	Leap-year, ☉ in Taurus			North Declination decreasing
1663.	Suns Long. D.M.	Suns Decl. D.M.		1664	Suns Long. D.M.	Suns Decli. D.M.	
1	20 44	18 0	15	1	21 28	18 12	
2	21 42	18 15		2	22 25	18 27	
3	22 39	18 30	14	3	23 23	18 42	
4	23 37	18 45		4	24 21	18 56	
5	24 35	18 59	14	5	25 18	19 10	
6	25 32	19 13		6	26 16	19 23	
7	26 30	19 27	13	7	27 13	19 37	
8	27 27	19 40		8	28 11	19 50	
9	28 25	19 53	13	9	29 9	20 3	
10	29 22	20 6		10	♊ 6	20 15	
11	♊ 20	20 18	12	11	1 4	20 27	
12	1 17	20 30		12	2 1	20 39	
13	2 15	20 41	11	13	2 58	20 50	
14	3 12	20 53		14	3 56	21 1	
15	4 14	21 4	10	15	4 53	21 11	
16	5 7	21 14		16	5 50	21 22	
17	6 4	21 24	10	17	6 48	21 32	
18	7 2	21 34		18	7 45	21 41	
19	7 59	21 44	9	19	8 43	21 50	
20	8 57	21 53		20	9 40	21 59	
21	9 54	22	8	21	10 37	22 8	
22	10 51	22 9		22	11 35	22 16	
23	11 48	22 17	7	23	12 32	22 23	
24	12 46	22 25		24	13 29	22 30	
25	13 43	22 32	7	25	14 27	22 37	
26	14 41	22 39		26	15 24	22 44	
27	15 38	22 45	6	27	16 21	22 50	
28	16 35	22 51		28	17 18	22 55	
29	17 32	22 57	5	29	18 15	23 0	
30	18 29	23 2		30	19 13	23 5	
31	19 26	23 7		31	20 10	23 10	

THE Forreign Account. And The Southing of the Stars just at midnight.

11	E	
12	F	
13	G	North Crown 27. 53 N.
14	A	Hinder Guard 73. 16 N.
15	B	Serpents Neck 7. 33 N.
16	C	
17	D	
18	E	
19	F	
20	G	
21	A	
22	B	
23	C	
24	D	
25	E	Mark Evangelist.
26	F	Scorpions heart 25. 36 S.
27	G	
28	A	
29	B	
30	C	
31	D	
1	E	JUNE.
2	F	
3	G	
4	A	Serpentar. knee 15. 13 S.
5	B	
6	C	Hercules head 14 50 N.
7	D	
8	E	
9	F	
10	G	

The Prime	The time of the New Moon. H.	M.	Week-day. Month-day.		The English Kalender.	Suns Rising H.	M.	Suns Setting H.	M.	First year ☉ in Gemini 1661 Suns Long. D.	M.	Suns Decli. D.	M.	Diff. of Decli.	Second year ☉ in Gemini 1662. Suns Longi. D.	M.	Sun Dec. D.	M.
			1	☾	3	47	8	11	1	20	51	22	13	4	1 20	37	23	12
13	12	36	2	♑	3	49	8	11	2	21	48	23	17		2 21	34	23	16
			3	☾	3	49	8	11	3	22	45	23	20	3	3 22	32	23	19
2	1	17	4	♒	3	48	8	12	4	23	43	23	23		4 23	29	23	22
10	21	26	5	♒	Boniface			12	5	24	40	23	26	2	5 24	26	23	25
			6	☾	3	48	8	12	6	25	37	23	28		6 25	23	23	27
18	17	35	7	♓	3	47	8	13	7	26	34	23	29	1	7 16	20	23	29
			8	☾	3	47	8	13	8	27	31	23	31		8 27	17	23	30
7	6	16	9	♓	3	47	8	13	9	28	28	23	31		9 28	15	23	31
15	18	57	10	♓	3	47	8	13	10	29	25	23	32		10 29	12	23	32
			11	♈	Longest day				11	♋	23	23	32		11 ♋	09	23	32
4	7	38	12	♈	Sun in canc.				12	1	20	23	31		12 1	06	23	32
12	3	47	13	☾	Dayes shor.				13	2	17	23	31	1	13 2	03	23	31
1	16	29	14	♉	3	47	8	13	14	3	14	23	30		14 3	00	23	30
			15	☾	3	47	8	13	15	4	11	23	28	2	15 3	57	23	28
9	12	37	16	♊	3	48	8	12	16	5	8	23	26		16 4	54	23	27
			17	♊	3	48	8	12	17	6	5	23	24	3	17 5	51	23	25
17	1	19	18	☾	3	48	8	12	18	7	2	23	21		18 6	48	23	22
6	21	27	19	♋	3	49	8	11	19	7	59	23	17	4	19 7	46	23	18
			20	☾	Edwa.		8	11	20	8	56	23	14		20 8	43	23	15
14	10	9	21	♋	3	49	8	11	21	9	54	23	10	5	21 9	40	23	11
3	22	30	22	♌	3	50	8	10	22	10	51	23	5		22 10	37	23	6
			23	☾	3	50	8	10	23	11	48	23	0	5	23 11	34	23	1
11	19	00	24	♌	John Bap.				24	12	45	22	55		24 12	31	22	56
			25	♌	3	52	8	8	25	13	42	22	49	6	25 13	28	22	50
19	7	40	26	☾	3	52	8	8	26	14	39	22	43		26 14	25	22	44
8	3	49	27	♍	3	53	8	7	27	15	36	22	37	7	27 15	22	22	38
16	16	30	28	♍	3	54	8	6	28	16	33	22	30		28 16	20	22	31
			29	♎	Peter Ap.				29	17	30	22	23	8	29 17	17	22	24
5	5	11	30	☾	3	56	8	4	30	18	28	22	15		30 18	14	22	17

Third year; ☉ in Gemini			Diff. of Decli	*Leap-year;* ☉ in Gemini			North Declination increasing, South Declination decreasing.	THE Forreign Account. And The Southing of the Stars just at Midnight.	
1663.	Suns Long.	Suns Decli		1664	Suns Long.	Suns Decli			
	D.M.	D.M.			D.M.	D.M			
1	20 24	23 11	4	1	21 7	23 14		11	A
2	21 21	23 15		2	22 4	23 18		12	B
3	22 18	23 18	3	3	23 1	23 21		13	C
4	23 15	23 21		4	23 58	23 24		14	D
5	24 12	23 24	2	5	24 56	23 26		15	E
6	25 9	23 27		6	25 53	23 28		16	F
7	26 7	23 29	1	7	26 50	23 30		17	G
8	27 4	23 30		8	27 47	23 31		18	A
9	28 1	23 31		9	28 44	23 32		19	B
10	28 58	23 32		10	29 41	23 32		20	C
11	29 55	23 32		11	♑ 38	23 32		21	D
12	♑ 52	23 32		12	1 36	23 31		22	E
13	1 49	23 31	1	13	2 33	23 30		23	F
14	2 46	23 30		14	3 30	23 29		24	G
15	3 43	23 28	2	15	4 27	23 27		25	A
16	4 41	23 27		16	5 24	23 25		26	B
17	5 38	23 25		17	6 21	23 23		27	C
18	6 35	23 22	3	18	7 18	23 20		28	D
19	7 32	23 19		19	8 15	23 16		29	E
20	8 29	23 15	4	20	9 12	23 13		30	F
21	9 26	23 12		21	10 9	23 9		1	G
22	10 23	23 7	5	22	11 7	23 4		2	A
23	11 20	23 3		23	12 4	22 59		3	B
24	12 17	22 58	6	24	13 1	22 53		4	C
25	13 14	22 52		25	13 58	22 48		5	D
26	14 12	22 46	7	26	14 55	22 42		6	E
27	15 9	22 40		27	15 52	22 35		7	F
28	16 6	22 33	8	28	16 49	22 28		8	G
29	17 3	22 26		29	17 46	22 21		9	A
30	18 0	22 19	9	30	18 44	22 13		10	B

(30.0.S.
Sagitarius arrow, head
Dragons head 51. 36. N.

John Baptist.

The Harp 38.30 N.

Peter Apostle.

Swans Bill 27. 17. N

July hath xxxj. dayes,

The Prime.	The time of the New Moon.	Moneth-day.	Week-day.	The English Kalender.		First year, ☉ in Cance			Diff. of Decli	Secona Yeare ☉ in Cance		
				Suns rising	Suns settin	1661.	Suns Long.	Suns Decli.		1662.	Suns Long	Suns Decli
	H. M.			H. M.	H. M		D. M.	D. M.			D. M	D. M
		1	G	Visit. Mar.		1	19 25	22 7	8	1	19 11	22 9
13	1 20	2	A	3 57	8 3	2	20 22	21 59		2	20 8	22 1
2	14 1	3	B	Martin	8 2	3	21 19	21 50	9	3	21 5	21 52
		4	C	3 59	8 1	4	22 16	21 41		4	22 2	21 43
10	10 10	5	D	4 1	7 59	5	23 13	21 32	10	5	23 0	21 34
		6	E	4 2	7 58	6	24 11	21 22		6	23 57	21 24
18	6 19	7	F	4 3	7 57	7	25 8	21 11	10	7	24 54	21 14
7	19 0	8	G	4 4	7 56	8	26 5	21 01		8	25 51	21 4
		9	A	4 5	7 55	9	27 2	20 50	11	9	26 48	20 53
15	7 41	10	B	4 6	7 54	10	28 59	20 39		10	27 46	20 42
4	20 22	11	C	4 7	7 53	11	28 57	20 27	12	11	28 43	20 30
12	16 31	12	D	Sun in	Leo	12	29 54	20 15		12	29 40	20 18
		13	E	4 10	7 50	13	♌ 51	20 3	13	13	♌ 37	20 6
1	5 12	14	F	4 11	7 49	14	1 48	9 50		14	1 35	19 53
		15	G	Swithin	48	15	2 36	19 37	13	15	2 32	19 40
9	1 21	16	A	4 14	7 46	16	3 43	19 24		16	3 30	19 27
17	14 3	17	B	4 15	7 45	17	4 40	19 10	14	17	4 37	19 14
		18	C	4 17	7 43	18	5 38	18 56		18	5 24	19 0
6	10 11	19	D	Dog da.	be.	19	6 35	18 42	14	19	6 21	18 45
14	22 53	20	E	Margar.	40	20	7 32	18 27		20	7 19	18 31
		21	F	4 21	7 39	21	8 30	18 12	15	21	8 16	18 16
3	11 14	22	G	Magdal.	37	22	9 27	17 57		22	9 13	18 1
		23	A	4 25	7 35	23	10 25	17 42	16	23	10 11	17 46
11	7 43	24	B	4 26	7 34	24	11 22	17 26		24	11 8	17 30
19	20 24	25	C	James Ap.		25	12 20	17 10	16	25	12 6	17 14
8	16 33	26	D	Anno	7 30	26	13 17	16 54		26	13 3	16 58
		27	E	4 31	7 29	27	14 15	16 37	17	27	14 1	16 41
16	5 14	28	F	4 33	7 27	28	15 12	16 20		28	14 58	16 24
5	17 55	29	G	4 35	7 25	29	16 10	16 3	17	29	15 56	16 7
		30	A	4 36	7 24	30	17 7	15 46		30	16 53	15 50
13	4 14	31	B	4 38	7 22	31	18 5	15 28		31	17 51	15 32

Third year, ☉ in Cancer			Diff. of Decli.	*Leap-year,* ☉ in Cancer			THE Forreign Account. And The Southing of the Stars just at Midnight.	
1663.	Suns Long. D.M.	Suns Decli D.M.		1664	Suns Long. D.M.	Suns Decli D.M		
1	18 57	22 11	8	1	19 41	22 5	11 ☾	
2	19 54	22 3		2	20 38	21 56	12 ☽	
3	20 52	21 54	9	3	21 35	21 48	13 ☾	
4	21 49	21 45		4	22 32	21 38	14 ♐	♐ Thigh, and Vulture
5	22 46	21 36	10	5	23 29	21 29	15 ♑	heart. 35. 27 S. 8. 2 N
6	23 43	21 26		6	24 26	21 19	16 ♒	
7	24 40	21 16	10	7	25 24	21 8	17 ♓	
8	25 37	21 06		8	26 21	20 58	18 ♈	
9	26 35	20 55	11	9	27 18	20 47	19 ♉	
10	27 32	20 44		10	28 15	20 35	20 ♊	
11	28 29	20 33	12	11	29 13	20 24	21 ♋	
12	29 26	20 21		12	♌ 10	20 12	22 ♌	
13	♌ 24	20 09	13	13	1 7	19 59	23 ♍	
14	1 21	19 56		14	2 4	19 47	24 ♎	
15	2 18	19 43	13	15	3 2	19 33	25 ♏	James Apostle.
16	3 15	19 30		16	3 59	19 20	26 ♐	
17	4 13	19 17	14	17	4 56	19 06	27 ♑	
18	5 10	19 03		18	5 54	18 52	28 ♒	Swans tail, and Dolphins
19	6 7	18 49	14	19	6 51	18 38	29 ♓	head, 44. 6 N. 14. 57 N.
20	7 5	18 34		20	7 48	18 23	30 ♈	
21	8 2	18 20	15	21	8 46	18 08	31 ♉	
22	9 0	18 05		22	9 43	17 53	1 ♊	*AUGUST.*
23	9 57	17 49	16	23	10 41	17 37	2 ♋	
24	10 54	17 34		24	11 38	17 22	3 ♌	
25	11 52	17 18	16	25	12 36	17 5	4 ♍	
26	12 49	17 02		26	13 33	16 49	5 ♎	
27	13 47	16 45	17	27	14 31	16 32	6 ♏	
28	14 44	16 29		28	15 28	16 16	7 ♐	
29	15 42	16 11	17	29	16 26	15 58	8 ♑	
30	16 39	15 54		30	17 23	15 41	9 ♒	
31	17 37	15 37		31	18 21	15 23	10 ♓	

North Declination decreasing.

August hath xxxj. dayes,

The Prime.	The time of the New Moon. H. M.	Moneth-day.	Week-day.	The English Kalender. Suns rising H. M.	Suns setting H. M.	1661.	First year, ⊙ in Leo. Suns Long. D. M.	Suns Decli. D. M.	Diff. of Decli.	1662.	Second Yeare ⊙ in Leo. Suns Long D. M.	Suns Decli D. M.
		1	C	Lamm.	20	1	19 02	15 10	18	1	18 48	15 13
2	2 45	2	D	4 41	7 19	2	20 00	14 52		2	19 46	14 56
10	22 54	3	E	4 43	7 17	3	20 58	14 34	19	3	20 44	14 38
		4	F	4 44	7 16	4	21 55	14 15		4	21 41	14 19
18	19 3	5	G	4 46	7 14	5	22 53	13 56	19	5	22 39	14 1
		6	A	4 48	7 12	6	23 51	13 37		6	23 37	13 42
7	7 44	7	B	4 50	7 10	7	24 48	13 18	19	7	24 36	13 23
15	20 25	8	C	4 52	7 8	8	25 46	12 59		8	25 32	13 3
		9	D	4 53	7 7	9	26 44	12 39	20	9	26 30	12 43
4	9 6	10	E	Laurence	5	10	27 42	12 19		10	27 28	12 23
12	5 15	11	F	4 57	7 3	11	28 40	11 59	20	11	28 26	12 3
1	17 57	12	G	4 59	7 1	12	29 38	11 39		12	29 24	11 43
		13	A	Sun in Vir.		13	♍ 35	11 19	21	13	♍ 22	11 23
9	14 5	14	B	5 2	6 58	14	1 33	10 58		14	1 19	11 3
		15	C	5 4	6 56	15	2 31	10 37	21	15	2 17	10 42
17	2 47	16	D	5 6	6 54	16	3 29	10 16		16	3 15	10 21
6	22 55	17	E	5 8	6 52	17	4 27	9 55	21	17	4 13	10 0
14	11 37	18	F	5 10	6 50	18	5 25	9 34		18	5 11	9 39
		19	G	5 12	6 48	19	6 23	9 12	22	19	6 9	9 17
		20	A	5 14	6 46	20	7 21	8 51		20	7 8	8 56
3	0 0	21	B	5 16	6 44	21	8 20	8 29	22	21	8 6	8 34
11	20 27	22	C	5 18	6 42	22	9 18	8 7		22	9 4	8 12
		23	D	5 20	6 40	23	10 16	7 45	22	23	10 2	7 50
19	9 8	24	E	Barthelm.		24	11 14	7 23		24	11 0	7 28
8	5 17	25	F	5 24	6 36	25	12 12	7 1	23	25	11 58	7 6
16	17 58	26	G	5 26	6 34	26	13 11	6 38		26	12 57	6 43
		27	A	5 28	6 32	27	14 9	6 16	23	27	13 55	6 21
5	6 39	28	B	Dogd. end		28	15 7	5 53		28	14 53	5 58
		29	C	John bebe.		29	16 6	5 30	23	29	15 52	5 35
13	2 48	30	D	5 33	6 27	30	17 4	5 48		30	16 50	5 13
2	15 29	31	E	5 35	6 25	31	18 3	4 45		31	17 49	4 50

Third year, ☉ in Leo			Diff. of Decli.	Leap-year, ☉ in Leo		
1663.	Suns Long	Suns Decl.		1664.	Suns Long.	Suns Decli.
	D. M.	D. M.			D. M.	D. M.
1	18 35	15 16	18	1	19 18	15 6
2	19 32	15 1		2	20 16	14 47
3	20 30	14 43	19	3	21 14	14 29
4	21 27	14 24		4	22 11	14 10
5	22 25	14 6	19	5	23 9	13 51
6	23 23	13 47		6	24 7	13 32
7	24 21	13 27	19	7	25 4	13 12
8	25 18	13 7		8	26 2	12 53
9	26 16	12 48	20	9	27 0	12 32
10	27 14	12 29		10	27 58	12 14
11	28 12	12 9	20	11	28 56	11 53
12	29 10	11 49		12	29 54	11 33
13	♍ 8	11 28	21	13	♍ 52	11 12
14	1 5	11 8		14	1 50	10 52
15	2 3	10 47	21	15	2 47	10 31
16	3 1	10 26		16	3 45	10 10
17	3 59	10 5	21	17	4 43	9 49
18	4 57	9 44		18	5 41	9 28
19	5 55	9 23	22	19	6 40	9 6
20	6 53	9 1		20	7 38	8 44
21	7 52	8 39	22	21	8 36	8 23
22	8 50	8 17		22	9 34	8 1
23	9 48	7 55	22	23	10 32	7 39
24	10 46	7 33		24	11 30	7 17
25	11 44	7 11	23	25	12 29	6 54
26	12 43	6 49		26	13 27	6 32
27	13 41	6 26	23	27	14 25	6 9
28	14 39	6 4		28	15 24	5 47
29	15 38	5 41	23	29	16 22	5 24
30	16 36	5 18		30	17 20	5 1
31	17 35	4 55		31	18 19	4 38

North Declination increasing

THE Forreign Account. And The Southing of the Stars just at midnight.

11	♐	
12	G	*Pegasus* mouth, and *Capricorns* tail.
13	A	
14	B	
15	C	
16	D	
17	E	
18	F	
19	G	
20	A	
21	B	
22	C	
23	D	
24	E	Bartholomew Apostle.
25	F	
26	G	
27	A	
28	B	
29	C	
30	D	
31	E	*Fomahant.*
1	F	*SEPTEMBER.*
2	G	*Pegasus* shoulder 26: 18 (N. and wing 13. 24. N.
3	A	
4	B	
5	C	
6	D	
7	E	
8	F	
9	G	
10	A	

September hath xxx. dayes.

The Prime	The time of the New Moon. H.	M.	Week-day. Moneth-day.	The English Kalender.	Suns Rising H. M	Suns seting H. M.	First year ⊙ in Virgo. 1661	Suns Long D. M.	Suns Decli. D. M.	Diff. of Decli. 1662.	Second year. ⊙ in Virgo. Suns Long D. M	Suns Decli. D. M.
			1 F	Giles	5 23		1	19 01	4 22	24	1 18 47	4 27
10	11	38	2 S		5 39	6 21	2	20 00	3 58		2 19 46	4 3
			3 S		5 41	6 19	3	20 58	3 36	24	3 20 44	3 41
18	7	47	4 M		5 43	6 17	4	21 57	3 12		4 21 43	3 17
7	20	28	5 T		5 45	6 15	5	22 55	2 49	24	5 22 41	2 55
			6 W		5 47	6 13	6	23 54	2 26		6 23 40	2 33
15	9	9	7 T	Nat. Elizab.			7	24 53	2 2	24	7 24 39	2 8
4	21	50	8 F	Nativ. Mar.			8	25 52	1 39		8 25 37	1 45
12	18	0	9 S		5 53	6 7	9	26 50	1 16	24	9 26 36	1 22
			10 S		5 55	6 5	10	27 49	0 52 North		10 27 35	0 58 North
1	6	41	11 M		5 57	6 3	11	28 48	0 29	24	11 28 34	0 35
			12 T		5 59	6 1	12	29 47	0 5		12 29 33	0 * 11
9	2	50	13 W	Sun in Libra			13	♎ 46	0 * 18 South	24	13 ♎ 31	0 13 South
17	15	35	14 T	Holy Crosse			14	1 45	0 42		14 1 30	0 36
			15 F		6 5	5 55	15	2 44	1 5	24	15 2 29	1 0
6	11	40	16 S		6 7	5 53	16	3 43	1 29		16 3 28	1 23
			17 S	Lambert	5 51		17	4 42	1 52	24	17 4 27	1 47
14	0	21	18 M		6 10	5 50	18	5 41	2 16		18 5 26	2 10
3	12	42	19 T		6 12	5 48	19	6 40	2 39	24	19 6 25	2 34
			20 W		6 14	5 46	20	7 39	3 3		20 7 25	2 57
11	9	11	21 T	Matth. Ap.			21	8 38	3 26	23	21 8 24	3 21
19	21	52	22 F		6 18	5 42	22	9 37	3 49		22 9 23	3 44
8	18	1	23 S		6 20	5 40	23	10 37	4 13	23	23 10 22	4 8
16	16	42	24 S		6 22	5 38	24	11 36	4 36		24 11 22	4 31
			25 M	Cyprian.	36		25	12 35	4 59	23	25 12 21	4 54
5	19	23	26 T		6 26	5 34	26	13 35	5 23		26 13 20	5 17
			27 W		6 28	5 32	27	14 34	5 46	23	27 14 20	5 40
13	15	32	28 T		6 30	5 30	28	15 33	6 9		28 15 19	6 4
			29 F	Michael A.			29	16 33	6 32	23	29 16 19	6 27
2	4	13	30 S	Hierom	5 26		30	17 32	6 54		30 17 18	6 49

1695	Third year, ☉ in Virgo. Suns Long. D. M.	Suns Decli D. M.	Dif. of Decl.	Leap-year, ☉ in Virgo. 1696 Suns Long. D. M.	Suns Decli D. M.
1	18 33	04 33	23	1 19 17	04 15
2	19 31	04 10		2 20 16	03 52
3	20 30	03 47	24	3 21 14	03 29
4	21 29	03 23		4 22 13	03 6
5	22 27	03 0	24	5 23 12	02 42
6	23 26	02 37		6 24 10	02 19
7	24 24	02 14	24	7 25 9	01 56
8	25 23	01 50		8 26 8	01 32
9	26 22	01 27	24	9 27 6	01 9
10	27 21	01 3		10 28 5	00 46
11	28 19	00 40	24	11 29 4	00 22
12	29 18	00 17		12 ♎ 3	00 1
13	♎ 17	00 7	24	13 1 2	00 25
14	1 16	00 30		14 2 1	00 48
15	2 15	00 54	24	15 3 0	01 12
16	3 14	01 17		16 3 59	01 36
17	4 13	01 41	24	17 4 58	01 59
18	5 12	02 4		18 5 57	02 22
19	6 11	02 28	24	19 6 56	02 46
20	7 10	02 51		20 7 55	03 9
21	8 9	03 15	23	21 8 54	03 32
22	9 9	03 38		22 9 54	03 56
23	10 8	04 2	23	23 10 53	04 19
24	11 7	04 25		24 11 52	04 42
25	12 7	04 48	23	25 12 52	05 6
26	13 6	05 11		26 13 51	05 29
27	14 5	05 34	23	27 14 50	05 52
28	15 5	05 58		28 15 50	06 15
29	16 4	06 21	23	29 16 49	06 38
30	17 4	06 44		30 17 49	07 1

North-Declination decreasing. | South Declination increasing.

THE Forreign Account, And The Southing of the Stars just at Midnight.

11	♓	
12	♈	
13	♉	
14	♊	
15	♋	
16	♌	
17	♍	
18	♎	
19	♏	(27. 14 N. 57. 18 N.
20	♐	Head *Andro. Caſ.* Chair
21	♑	Matth. ♐. *Pegaſus* wing
22	♒	(up 13. 18. N.
23	♓	North in Whales tail. 10
24	♈	(41. South.
25	♉	
26	♊	
27	♋	
28	♌	
29	♍	Michael Archangel.
30	♎	South in Whales tail.
1	♏	*OCTOBER.* (19. 51. S
2	♐	Pole Star 87. 30 N.
3	♑	
4	♒	
5	♓	
6	♈	South in *Andromeda's*
7	♉	(Girdle, 33. 52 N.
8	♊	
9	♋	
10	♌	*Caſſiopeia's* knee 58. 27. (N.

The time of the New Moon.	The Prime.	Month-day.	Week-day.	The English Kalender. Suns rising	Suns setting	First year, ⊙ in Libra 1661. Suns Long.	Suns Decli.	Diff. of Decli	Second Yeare ⊙ in Libra 1662. Suns Long	Suns Decli
H. M.				H. M.	H. M.	D. M.	D. M.		D. M.	D. M.
		1	A	6 36	5 24	1 18 32	7 17	23	1 18 18	7 11
10	0 22	2	B	6 38	5 22	2 19 32	7 40		2 19 17	7 34
18	20 31	3	C	6 40	5 20	3 20 31	8 3	22	3 20 17	7 57
		4	D	6 42	5 18	4 21 31	8 25		4 21 16	8 19
7	9 12	5	E	6 44	5 16	5 22 31	8 48	22	5 22 16	8 43
15	21 53	6	F	Faith	5 14	6 23 30	9 10		6 23 16	9 5
		7	G	6 48	5 12	7 24 30	9 32	22	7 24 16	9 26
4	10 34	8	A	6 50	5 10	8 25 30	9 54		8 25 15	9 48
12	6 44	9	B	Denis	5 8	9 26 30	10 16	22	9 26 15	10 10
1	19 25	10	C	6 54	5 6	10 27 30	10 37		10 27 15	10 33
		11	D	6 56	5 4	11 28 29	10 59	21	11 28 15	10 53
9	15 34	12	E	6 58	5 2	12 29 29	11 20		12 29 15	11 15
		13	F	Sun in Scor		13 ♏ 29	11 41	21	13 ♏ 15	11 36
17	4 15	14	G	7 2	4 58	14 1 29	12 2		14 1 15	11 57
		15	A	7 3	4 57	15 2 29	12 23	21	15 2 15	12 18
9	0 24	16	B	7 5	4 55	16 3 30	12 44		16 3 15	12 39
14	13 5	17	C	7 7	4 53	17 4 30	13 4	20	17 4 15	12 59
		18	D	Luke Eva.		18 5 30	13 24		18 5 15	13 19
3	1 26	19	E	7 11	4 49	19 6 30	13 44	20	19 6 15	13 39
11	21 55	20	F	7 13	4 47	20 7 30	14 4		20 7 16	13 59
		21	G	7 14	4 46	21 8 30	14 24	19	21 8 16	14 19
19	10 36	22	A	7 16	4 44	22 9 31	14 43		22 9 16	14 38
8	6 45	23	B	7 18	4 42	23 10 31	15 2	19	23 10 16	14 58
16	19 26	24	C	7 20	4 40	24 11 31	15 21		24 11 17	15 17
		25	D	Crispine	38	25 12 32	15 40	18	25 12 17	15 35
5	8 7	26	E	7 23	4 37	26 13 32	15 58		26 13 18	15 54
		27	F	7 25	4 35	27 14 32	16 16	18	27 14 18	16 12
13	4 16	28	G	Sim. & Jud		28 15 33	16 34		28 15 19	16 29
2	16 57	29	A	7 29	4 31	29 16 34	16 51	17	29 16 19	16 46
		30	B	7 30	4 30	30 17 34	17 8		30 17 19	17 4
10	13 6	31	C	7 32	4 28	31 18 35	17 25		31 18 20	17 21

Third year, ☉ in Libra 1663.	Suns Long D.	M.	Suns Decl. D.	M.	Diff. of Decli.	Leap-year, ☉ in Libra 1664.	Suns Long. D.	M.	Suns Decli D.	M
1	18	3	07	6	23	1	18	48	07	23
2	19	3	07	29		2	19	48	07	46
3	20	2	07	52	22	3	20	48	08	9
4	21	2	08	14		4	21	47	08	31
5	22	2	08	37	22	5	22	47	08	54
6	23	2	08	59		6	23	47	09	16
7	24	1	09	21	22	7	24	47	09	38
8	25	1	09	43		8	25	46	10	0
9	26	1	10	5	22	9	26	46	10	22
10	27	1	10	27		10	27	46	10	43
11	28	1	10	48	21	11	28	46	11	5
12	29	0	11	10		12	29	46	11	26
13	m	0	11	31	21	13	m	4[illegible]	[illegible]1	47
14	1	0	11	52		14	1	4[illegible]	12	8
15	2	0	12	13	21	15	2	46	12	29
16	3	0	12	34		16	3	46	12	49
17	4	1	12	54	20	17	4	46	13	9
18	5	1	13	14		18	5	46	13	30
19	6	1	13	34	20	19	6	47	13	50
20	7	1	13	54		20	7	47	14	10
21	8	1	14	14	19	21	8	47	14	29
22	9	2	14	33		22	9	47	14	48
23	10	2	14	53	19	23	10	48	15	7
24	11	2	15	12		24	11	48	15	26
25	12	2	15	30	18	25	12	48	15	44
26	13	3	15	49		26	13	49	16	3
27	14	3	16	7	18	27	14	49	16	21
28	15	4	16	24		28	15	50	16	38
29	16	4	16	43	17	29	16	50	16	56
30	17	5	17	0		30	17	51	17	13
31	18	5	17	17		31	18	51	17	30

South Declination increasing

THE Forreign Account. And The Southing of the Stars just at midnight.

11	D	
12	E	
13	F	
14	G	
15	A	
16	B	
17	C	
18	D	Luke Evangelist
19	E	N. & S. in the Rams horn
20	F	(19.9 N: 17 38 N.
21	G	
22	A	Rams head 21. 51 N.
23	B	
24	C	
25	D	
26	E	
27	F	
28	G	Simon and Jude.
29	A	
30	B	
31	C	
1	D	
2	E	NOVEMBER.
3	F	
4	G	
5	A	
6	B	Whales jaw, and *Me-*
7	C	*dusa's* head. 2. 44 N.
8	D	(39.37 N.
9	E	*Perseus* side. 48. 35 N.
10	F	

November hath xxx. dayes,

The time of the New Moon.	The Prime.	Month-day.	Weekdays.	The English Kalender. Suns rising	Suns setting	1961. First year, ☉ in Scorpio. Suns Long.	Suns Decli.	Diff. of Decli.	1962. Second Yeare ☉ in Scorpio. Suns Long	Suns Decli
H. M.				H. M.	H. M.	D. M.	D. M.		D. M.	D. M.
		1	D	All Saints		1 19 35	17 42	16	1 19 21	17 38
18 9 15		2	E	7 36	4 24	2 20 39	17 58		2 20 21	17 54
7 21 56		3	F	7 37	4 21	3 21 37	18 14	16	3 21 22	18 10
		4	G	7 29	4 21	4 22 37	18 30		4 22 23	18 26
15 10 38		5	A	Pow. Plat		5 23 38	18 45	15	5 23 23	18 42
4 23 29		6	B	Leonard	17	6 24 39	19 0		6 24 24	18 57
12 15 28		7	C	7 44	4 16	7 25 40	19 15	14	7 25 25	19 11
		8	D	7 45	4 15	8 26 40	19 29		8 26 26	19 25
1 8 m9		9	E	7 47	4 13	9 27 41	19 43	14	9 27 26	19 39
		10	F	7 48	4 12	10 28 42	19 57		10 28 27	19 53
9 4 18		11	G	Martin	11	11 29 43	20 10	13	11 29 28	20 7
17 17 00		12	A	Brain Bp.		12 1 44	20 23		12 1 29	20 20
		13	B	7 52	4 8	13 1 45	20 35	13	13 1 30	20 32
6 13 08		14	C	7 53	4 7	14 2 46	20 48		14 2 31	20 44
		15	D	7 55	4 5	15 3 46	20 59	12	15 3 32	20 56
14 1 49		16	E	7 56	4 4	16 4 47	21 10		16 4 33	20 8
3 14 38		17	F	Q. Eliz.		17 5 48	21 21	11	17 5 34	21 19
		18	G	7 58	4 2	18 6 49	21 32		18 6 35	21 30
11 10 39		19	A	7 59	4 1	19 7 50	21 42	10	19 7 36	21 40
19 23 20		20	B	Edmund.	0	20 8 51	21 52		20 8 37	21 50
8 19 29		21	C	8 1	3 59	21 9 53	22 1	9	21 9 38	21 59
		22	D	Cecily	3 59	22 10 54	22 10		22 10 39	22 8
16 8 10		23	E	Clemen	57	23 11 55	22 18	8	23 11 40	22 16
5 20 51		24	F	8 4	3 56	24 12 56	22 26		24 12 41	22 24
		25	G	Catharin	55	25 13 57	22 34		25 13 42	22 32
13 17 00		26	A	8 6	3 54	26 14 58	22 41	7	26 14 43	22 39
		27	B	8 7	3 53	27 15 59	22 47		27 15 44	22 46
2 5 41		28	C	8 8	3 52	28 17 1	22 54	6	28 16 46	22 54
		29	D	8 9	3 51	29 18 2	22 59		29 17 47	22 58
10 1 50		30	E	Andrew		30 19 3	23 5	5	30 18 48	23 3

Third year, ☉ in Scorpio					Diff. of Decl.	Leap-year, ☉ in Scorpio					THE Forreign Account. And The Southing of the Stars just at midnight.		
1699	Suns Long.		Suns Decl.			1700	Suns Long.		Suns Decl.				
	D.	M.	D.	M.			D.	M.	D.	M.			
1	19	6	17	34	1	1	19	52	17	46	11	G	
2	20	7	17	50		2	20	53	18	03	12	A	
3	21	7	18	6	16	3	21	53	18	18	13	B	
4	22	8	18	22		4	22	54	18	34	14	C	
5	23	9	18	38	15	5	23	55	18	49	15	D	
6	24	9	18	53		6	24	55	19	04	16	E	
7	25	10	19	8	14	7	25	56	19	19	17	F	Perseus foot 50. 52 N.
8	26	11	19	22		8	26	57	19	33	18	G	
9	27	12	19	36	14	9	27	58	19	47	19	A	
10	28	13	19	50		10	28	58	20	00	20	B	
11	29	13	20	4	13	11	29	59	20	13	21	C	
12	♑	14	20	16		12	♑	0	20	26	22	D	
13	1	15	20	29	12	13	1	1	20	39	23	E	
14	2	16	20	42		14	3	2	20	51	24	F	
15	3	17	20	53	11	15	4	3	21	02	25	G	
16	4	18	21	5		16	5	4	21	13	26	A	
17	5	19	21	16	11	17	6	5	21	24	27	B	
18	6	20	21	27		18	7	6	21	35	28	C	Bulls eye 15. 47 N.
19	7	21	21	37	10	19	8	7	21	45	29	D	
20	8	22	21	47		20	9	8	21	54	30	E	And two Apostle.
21	9	23	21	57	9	21	10	9	22	03	1	F	DECEMBER.
22	10	24	22	6		22	11	10	22	12	2	G	
23	11	25	22	14	8	23	12	12	22	20	3	A	
24	12	26	22	22		24	13	13	22	28	4	B	
25	13	27	22	30	7	25	14	14	22	36	5	C	The Sow 45. 36 N.
26	14	28	22	37		26	15	15	22	43	6	D	
27	15	29	22	44	6	27	16	16	22	49	7	E	Orions foot 8. 37 S.
28	16	♒	22	51		28	17	17	22	55	8	F	
29	17	1	22	57	5	29	18	19	23	01	9	G	Orions first shoulder 06.
30	18	3	23	2		30	19	20	23	06	10	A	00 North.

South Declination increasing

The Prime	The time of the New Moon. H.	M.	Week-day. Moneth-day.		The English Kalender.	Suns Rising H.	M	Suns Setting H	M	First year ⊙ in Sagitarius, 1661.	Suns Long: D.	M.	Suns Decli. D.	M.	Diff. of Decli.	Second year ⊙ in Sagitarius. 1662.	Suns Longi. D.	M.	Suns Dec. D	M
18	14	31	1	F		8	10	3	50	1	20	4	23	10	4	1	19	49	23	8
			2	G		8	11	3	49	2	21	5	23	14		2	20	51	23	13
7	10	40	3	A		8	11	3	49	3	22	7	23	18	3	3	21	52	23	17
15	23	22	4	B		8	12	3	48	4	23	8	23	21		4	22	53	23	20
			5	C		8	12	3	48	5	24	9	23	24		5	23	54	23	23
4	12	2	6	D		8	12	3	48	6	25	11	23	27		6	24	56	23	26
12	8	12	7	E		8	12	3	48	7	26	12	23	29	2	7	25	57	23	28
1	20	53	8	F	Con. Mary					8	27	13	23	30		8	26	58	23	30
			9	G		8	13	3	47	9	28	14	23	31		9	28	0	23	31
9	17	2	10	A		8	13	3	47	10	29	16	23	32		10	29	1	23	32
			11	B	Shortest day					11	♑	17	23	32		11	♑	2	23	32
17	5	43	12	C	Sun in Capr					12	1	18	23	32		12	1	3	23	32
			13	D	Lucie	8	13	3	47	13	2	20	23	31	1	13	2	5	23	31
6	1	50	14	E		8	13	3	47	14	3	21	23	29		14	3	6	23	30
14	14	33	15	F		8	13	3	47	15	4	22	23	28	2	15	4	7	23	29
			16	G		8	12	3	48	16	5	24	23	26		16	5	9	23	27
3	2	54	17	A		8	12	3	48	17	6	55	23	23	3	17	6	10	23	24
11	23	23	18	B		8	12	3	48	18	7	26	23	19		18	7	11	23	20
			19	C		8	11	3	48	19	8	28	23	16	4	19	8	13	23	16
19	12	4	20	D		8	11	3	49	20	9	29	23	11		20	9	14	23	12
8	8	13	21	E	Thomas A					21	10	30	23	7	5	21	10	15	23	8
16	20	54	22	F		8	10	3	50	22	11	32	23	2		22	11	17	23	3
			23	G		8	9	3	51	23	12	33	23	56	6	23	12	18	22	57
5	9	35	24	A		8	8	3	52	24	13	34	22	50		24	13	19	22	51
			25	B	Christs Na					25	14	36	22	44	7	25	14	21	22	45
13	5	44	26	C	Stephen M					26	15	37	22	37		26	15	22	22	38
2	18	25	27	D	John Evan					27	16	38	22	30	8	27	16	23	22	31
			28	E	Innocentia.					28	17	39	22	23		28	17	25	22	24
10	14	34	29	F		8	4	3	56	29	18	41	22	13	9	29	18	26	22	15
			30	G		8	3	3	57	30	19	42	22	5		30	19	27	22	7
18	3	51	31	A		8	2	3	58	31	20	43	21	56		31	20	28	21	58

Third year, ⊙ in Sagitarius			Diff. of Decli	Leap-year, ⊙ in Sagitarius		
1695	Suns Long.	Suns Decli		1696	Suns Long.	Suns Decli
	D. M.	D. M.			D. M.	D. M.
1	19 35	23 07	5	1	20 21	23 10
2	20 36	23 12		2	21 22	23 15
3	21 37	23 16	4	3	22 24	23 19
4	22 38	23 20		4	23 25	23 22
5	23 40	23 23	3	5	24 26	23 25
6	24 41	23 26		6	25 27	23 27
7	25 42	23 28		7	26 29	23 29
8	26 43	23 29		8	27 30	23 30
9	27 45	23 31		9	28 31	23 31
10	28 46	23 32		10	29 32	23 32
11	29 47	23 32		11	♈ 3	23 32
12	♈ 49	23 32		12	1 35	23 31
13	1 50	23 31	1	13	2 36	23 30
14	2 51	23 30		14	3 38	23 29
15	3 53	23 29	2	15	4 39	23 27
16	4 54	23 27		16	5 40	23 25
17	5 55	23 24	3	17	6 42	23 21
18	6 57	23 21		18	7 43	23 18
19	7 58	23 17	4	19	8 44	23 15
20	8 59	23 14		20	9 45	23 10
21	10 1	23 09	5	21	10 47	23 05
22	11 2	23 04		22	11 48	23 00
23	12 3	22 59	6	23	12 50	22 54
24	13 5	22 53		24	13 51	22 48
25	14 6	22 47	7	25	14 52	22 42
26	15 7	22 40		26	15 54	22 35
27	16 8	22 33	8	27	16 55	22 27
28	17 10	22 25		28	17 56	22 19
29	18 11	22 17	9	29	18 58	22 11
30	19 12	22 09		30	19 59	22 02
31	20 14	22 00		31	21 00	21 53

South Declination increasing. | South Declination decreasing.

THE Forreign Account. And The Southing of the Stars just at Midnight.

11	♑	First in *Orions* Girdle, (00.35 South.
12	♑	
13	♑	
14	♑	(44.52 N.
15	♑	The Wagoners shoulder
16	♑	*Orions* right shoulder (7.18 N.
17	♑	
18	♑	
19	♑	
20	♑	
21	♑	Thomas Apostle.
22	♑	
23	♑	
24	♑	*Pollux* foot 16.39N.
25	♑	Christs Nativity.
26	♑	Stephen Martyr.
27	♑	John Evangelist
28	♑	Innocents. the great dog (16.33 South
29	♑	
30	♑	
31	♑	
1	♒	JANUARY.
2	♒	
3	♒	
4	♒	
5	♒	
6	♒	Twelfth day
7	♒	First head of ♊ *Castor*, (32.34 N.
8	♒	
9	♒	The little dog 6.5 N.
10	♒	2d. head of ♊ 28.48 N.

A Table of the Suns Declination for every degree of the Ecliptick.

Degrees.	♈ ♎ D.	M.	S.	♉ ♍ D.	M.	S.	♊ ♌ D.	M.	S.	Degrees.
0	0	00	00	11	30	58	20	13	48	30
1	0	23	57	11	52	2	20	16	23	29
2	0	47	54	12	12	54	20	18	58	28
3	1	11	51	12	33	36	20	21	32	27
4	1	35	46	12	54	6	20	24	5	26
5	1	59	39	13	14	22	20	26	37	25
6	2	23	31	13	34	25	20	29	9	24
7	2	47	21	13	54	14	20	31	40	23
8	3	11	8	14	13	50	20	34	11	22
9	3	34	52	14	33	11	20	36	41	21
10	3	58	33	14	52	18	20	39	11	20
11	4	22	11	15	11	10	20	41	40	19
12	4	45	45	15	29	46	20	44	9	18
13	5	9	13	15	48	6	20	46	37	17
14	5	32	36	16	6	11	20	49	4	16
15	5	55	55	16	23	58	20	51	30	15
16	6	19	8	16	41	30	20	53	55	14
17	6	42	15	16	58	46	20	56	19	13
18	7	5	15	17	15	42	20	58	42	12
19	7	28	9	17	32	18	21	0	55	11
20	7	50	56	17	48	38	21	3	7	10
21	8	13	37	18	4	40	21	5	19	9
22	8	36	9	18	20	21	21	7	31	8
23	8	58	33	18	35	43	21	9	42	7
24	9	20	48	18	50	46	21	11	53	6
25	9	42	54	19	5	28	21	14	3	5
26	10	4	50	19	19	51	21	16	13	4
27	10	26	38	19	33	52	21	18	21	3
28	10	48	16	19	47	32	21	20	29	2
29	11	9	43	20	0	50	21	22	36	1
30	11	30	58	20	14	47	21	24	42	0
	♏			♌			♑			
	♐			♒			♓			

The use of this Table of the Suns Declination.

The Suns greatest declination according to the observation of Tycho Brahe, and Mr. Edward Wright, is 23 Deg. 31 Min. 30 Seconds, and so it was in their times, but later observers have found it some what more, so that it amounts to in these times 23 deg. 32 m. or very little lesse: and therefore I have calculated this table to 23 deg. 32 m. for those which shall desire so much exactnesse.

The use of this Table is thus, if you would know the Declination of the Sun, in any deg. & min of the Ecliptick, first mark whether the Signe be at y head or the foot of the Table, if the Signe be at the top of the table, then count the deg. of the signe downwards in the first column of the table, but if the sign beat the foot of the table, then count the deg. upward, and in the last column of the table, and in the common angle, where the character of the signe, and the deg. thereof meets, you shall have y Suns declination in deg. min. and seconds. And here note, if the place of the Sun have both deg. and m. you must see what is the difference of the Declination between the two next deg. and by proportion allow for the odd minutes. Thus

Thus for *Example*.

The Suns place being 10 deg of ♉ or ♍, you see the Character of ♉ or ♍, are at the top of the Table; therefore find out 10 in the first Column and in the same line under ♉, you shall find 14, 52, 18, that is 14 deg. 52 min. 18 sec. for the Declination.

But if you would know the Suns declination, being in 10 deg. of ♌ or ♒, then because the Characters are at the bottom of the Table, you must count the deg. upward in the last Column, and so against 10 deg. you shall find 17 deg. 48 min. 38 sec. for the Suns declination.

But if the Sun were in 18 deg. 15 min. of ♉ first you see by the Table, that the 18 deg. of ♉ hath 17 deg. 15 min. 42 sec. for its declination; and the 19 deg. hath 17 deg. 32 min. 18 sec. for its declination; the difference between them is 16 min. 36 sec. Then to finde out by the rule of proportion, how much to allow for the 15 min. Say, if 60 min. give 16 min 36 sec, what shall 15 min. have. And you shall finde 4 min. 9 sec. Then consider by the order of the Table, whether this be to be aded or subtracted. In this example, it is to be added to the foresaid 17 deg. 15 min 42 sec. & so the Suns declination will be 17 deg. 19 min. 51 sec.

And after this maner you may trye the Tables of the Suns declination in y Ephemerides, or if need be, you may rectifie them for the time to come. But in ordinary occasions you may leave out the seconds, unlesse they be more than 30, and then you may adde one to the min. for them.

The use and Explanation of the former *Ephemerides*.

These Tables are calculated onely for four years, and neither more or lesse, because the Leap year is so contrived to regulate the Suns course that every fifth year the Sun returns to y same place it was before, without any sensible errour for many Years together. So that these Tables may very well serve for 20 years to come, only observing the order of the years from the Leap-year, and taking that Section in the Kalender which belongs unto them.

And that these Tables may last the better, and the longer, I have calculated them now somewhat forwarder than they should

be; they being exactly calculated for the years 1665, 1666, 1667, 1668, by which means they will serve these next 10 years, viz. from 1657, to 1677, without any allowance. For there will not be above 4 min. difference in the Suns place more or lesse, any time these 10 years; which makes but a minute & a half of difference in the Suns declination (even where the Declination is swiftest) and so can breed no error of danger to the Sea-man in his observations.

But if you will be so exact, that you may the better know what years these four Sections of the Ephemerides belong unto, and the minutes which you must adde or subtract to the Longitude of the Sun, to make these Tables more exact herein, observe this Table; But I would wish you not to correct the Declination at all, but rather let it abide as it is, lest for want of skill and heed, you make it worse: unless you do it according to Art, by the Table of Declinations at the end of the Ephemerides.

First,	Second,	Third,	Leap-year,	
1657	1658	1659	1660	4 Sub.
1661	1662	1663	1664	2 Sub.
1665	1666	1667	1668	0
1669	1670	1671	1672	2 Adde
1673	1674	1675	1676	4 Adde.

To find the Longitude and Declination of the Sun at any time, by these Tables.

First, consider whether it be the first, second, or third year after the Leap-year, (which you may know by the Table at the beginning of the Ephemerides, or in this little Table) and accordingly look downe that Section, which belongs thereunto, and in the Moneth propoted, just against the day of the Moneth you shall have your desire.

For Example.

If you would know the place and Declination of the Sun the 12 day of April 1667. First, you must note that the year 1667, is one of the third years from the Leap-year, and therefore you must look downe in that Section for the day of the Moneth, and now

now if you turn to the moneth of April against the 12 day of that moneth in the aforesaid Section, you shall find, that the Longitude of the Sun is 2 deg. 23 min. of Taurus, and the Declination of the Sun is 12 deg. 21 min. of North Declination. And this is the place and Declination of the Sun, not only this day of this year, but also all the other years which are joyned with it in the former Table, 1659, 1663, 1671, 1675, without any sensible difference, especially in the Declination, which is the thing most necessary for the Seamans use.

And thus with much facility, you may know the true Longitude and Declination of the Sun at any time, which is of very great use for the finding of the Latitude of any place, and in working most other conclusions of the Sphere, as you shall see more in its place.

To know the time of the Moons Change, Full, and Quarters.

TO know the day and hour of Conjunction or Change of the Moon, first look into the first page of the Ephemerides, right against the date of the year, you shall find the Prime or Golden Number, which you must remember; and also the Sunday Letter for that year, then turn to the moneth in which you would know the Change of the Moon, & look out the Prime number in the first Column, and by it in the second Column you shall have the time of the Change in hours and minutes, which hours and minutes you must always reckon afternoon; then in the third Column you shall have the day of the moneth, and in the fourth you shall know the day of the week. For Example.

Anno 1675, I would know the time of the new Moon in June, In the first page of the Kalender, I find that the Prime is 4, and the Sunday Letter C, then I turn to the moneth of June, & I find out the Prime 4, in the first Column, and it stands just against the 12 day, which by the Sunday Letter you may see is Saturday, now for the time of the change this day in the second Column you find 7 hours 38 min. which you must always reckon to be afternoon. So that in your year 1675, it is new Moon the 12 of June, being Saturday at 7 of the clock and 38 min. afternoon.

Here you must note, that if the hours and min. of the Change be above 12, then the Change is the next day in the morning, according to ordinary account, but this way is altogether used by the Astronomers, who begin the day at noon, and after a little

use by this Table you may readily understand it. For first
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, hours after noon is the common reckoning. Then
13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, is all one with
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, the next morning.

Or else substract 12 hours from the number, and the remainer is the time of the day the next morning.

Thus the same year 1675, the Prime, being 4 in y moneth of May, the moon will Change the 13 day, at 18 hours, 54 min. afternoon, that is, at 6 of the clock, 54 min. in the morning on the 14 day being Friday.

And thus you may finde the time of the Quarters and full moon by having the new moon.

If you adde these	days, hou, min.
For the first Quarter,	7 9 11
For the full moon,	14 18 22
For the last Quarter,	22 3 33
And the whole time from moon to moon, is	29 12 44

Thus you shall have the change of the moon and Quarters, according to her equal motions which will be best, considering the following conclusions: though it differs a few hours from the time of the New moon.

To know what Sign the Moon is in.

TO this purpose you must remember, that the twelve Signes are thus numbred by Astronomers.

Aries,	Taurus,	Gemini,	Cancer,	Leo,	Virgo.
0	1	2	3	4	5
Libra,	Scorpio,	Sagitarius,	Capricorn,	Aquarius,	Pisces
6	7	8	9	10	11

Now at the Change, the Sun and Moon are both in one sign and degree, which in the former Example of the New Moon the 12 of June is 1 deg. of Cancer, for that is the place of the Sun, according to the Ephemerides, the which you must set down thus,

3 Sig. 1 deg. 0 min.

A Table shewing the *Moons* motion in Signs, Degr. and *Minutes*, for every day and hou. of her Age.

The dayes of the *Moons* age.	S.	D.	*M.*
1	0	13	11
2	0	26	21
3	1	9	32
4	1	22	42
5	2	5	53
6	2	19	3
7	3	2	14
8	3	15	25
9	3	28	35
10	4	11	46
11	4	24	56
12	5	8	7
13	5	21	18
14	6	4	28
15	6	17	39
16	7	0	49
17	7	14	0
18	7	27	11
19	8	10	21
20	8	23	32
21	9	0	42
22	9	19	53
23	10	3	3
24	10	16	14
25	10	29	25
26	11	12	35
27	11	29	46
28	0	8	56
29	0	22	7
30			

The hours of the Moons age.	D.	*M.*
1	0	33
2	1	6
3	1	39
4	2	12
5	2	45
6	3	18
7	3	51
8	4	24
9	4	56
10	5	29
11	6	2
12	6	35
13	7	8
14	7	41
15	8	14
16	8	47
17	9	20
18	9	53
19	10	26
20	10	59
21	11	32
22	12	5
23	12	38
24	13	11

NOw by this Table, knowing the age of the Moon since the change, you may see how much must be aded to the place of the Moon that she then was in, & if it shall come to more signs then 12, you must cast twelbe away, and that which remains, will shew the Sign, Degree, and Minute the moon is in.

For Example.

Suppose you would know the moons place the 19 of June, at Noon Ann. 1675, ye Change was the 12 day, at 8 hours at night. Therefore the 19 day at noon, the moon is 6 days and 16 hours old.

Now the place of the Sun and moon at the Change was as was shewed before,

	Seg.	Deg.	Min.
	3	1	0
The Moons motion for 6, dayes is —	2	19	3
And for 16 hours,	0	8	47
The sum is	5	28	50

That is, in 28 deg. 50 m. of Vir.

Or else you may multiply the Moons age by 2, and divide the Product by 5, and the Quotient will

A Table shewing the time of the Moons coming to the South by her age.

Moons age.	H.	M.	The hours of the Moons age.	Min
1	0	49	1	2
2	1	38	2	4
3	2	26	3	6
4	3	15	4	8
5	4	3	5	10
6	4	53	6	12
7	5	41	7	14
8	6	30	8	16
9	7	19	9	18
10	8	8	10	20
11	8	56	11	22
12	9	45	12	24
13	10	34	13	26
14	11	23	14	28
15	12	11	15	30
16			16	32
17	1	0	17	34
18	1	49	18	36
19	2	38	19	38
20	3	26	20	40
21	4	15	21	42
22	5	3	22	44
23	5	53	23	46
24	6	41	24	48
25	7	30		
26	8	19		
27	9	8		
28	9	56		
29	10	45		
30	11	34		

Afternoon. Morning. The days of the Moons age.

will shew you how many Signs, and the Remainer so many times 5 degrees as the Moon is gone from that Sign and degree, where the Sun is at that present time.

The use of this Table is such.

KNowing as before, the time of the New Moon, you may easily know her age any day at Noon in days and hours.

Then see what time is allowed for the Dayes, and after for the odde Hours, and add them together; lastly, see how many minutes is to be allowed for this time, and the sum of all will be the time of the Moons coming to the South.

Example.

Suppose the Moon be any day at Noon 10 days, and 8 hours old, the Table will shew first.

For the 0 day	8 hou.	8 min.
For the 8 hours	0	16
which is	8	24
Now 8 hours 24 min. requires	0	17
All which is the time of the Moons coming to the South.	8	41

Or else you may do this by the Instrument, page the 9, thus, Turn the mobable Circle, so that the age of the Moon may be upon the North or South point of the Compass, and the Index will shew the time of the Moons coming to the South.

Or else by Arithmetick, multiply the Moons age by 12, and divide the Product by 15, so the Quotient will shew the hour of the Moons coming to the South, and if any thing remain, multiply it by 4, & that will shew the minutes to be added to the hours of the Quotient, & so you shall have the time of the Moons coming to the South.

This knowledge of the Moons coming to the South, is very necessary for many purposes; for first, hereby you may know the time of high tide at any place, as is shewed before.

Secondly, knowing the time of the Moons coming to the South, you may know the time of the night by the shining of the Moon upon any Sun-Dial. Thus:

Observe by a Sun-dial as if you would see what a clock it were by the Moon and observe how much the shadow of the Moon doth either lack or is past the twelve upon the Dial: for so much it doth want of, or is past the time of the Moons coming to the South.

For Example.

Suppose as before, the Moon did come to the South at 8 hours 41 min. afternoon, and the shadow of the Moon upon the Dial were at 10, this wants 2 hours of 12: and therefore it wants 2 hours of 8 hours 41 min. so that it is 6 of the clock and 41 min. But if the shadow of the Moon had been at 2 upon the Dial, then you must have added 2 hours to the Moons coming to the South, and so it had been 10 hours 41 min. at night.

Again, by the time of the Moons coming to the South, and the place of the Moon in the Zodiack, you may know the time of the Moons rising and setting, as thus, knowing what sign & degree the Moon is in, as before, look out when the Sun is in that sign and degree in the Ephemerides, and right against it in the proper column, you shall find the time of the Suns setting, when the Sun is in that sign and degree, this time is half the diurnal arch belonging to that sign & degree of the Ecliptick, which being added

to the time of the Moons being South, it will shew the time of the Moons setting, and if you substract it from the Moons being South, it will shew her rising. For Example.

Suppose the Moon to be in ten degrees of Taurus, and the time of her coming to the South at ten of the clock at Night. First, I look when the Sun is in ten degrees of Taurus, and that is the 20th of April, and the time of Sun-set that day is 7 hours 18 min. this added to 10 hours, the time of the Moons being South, is 17 hours, 18 min. which is 5 of the clock, and 18 min. the next morning, for the time of the Moons setting; likewise this substracted from 10 hours, there remains 2 hours 42 min. the time of the Moons rising.

To find the length of the Day and Night.

In the fifth Column of the Kalender (among the fixed Feasts) you have the time of the Suns rising and setting, by which you may know the length of the day and night: for the hours & min. of the Suns rising being doubled, gives the length of the Night, and the hours and minutes of the Suns setting being doubled gives the length of the day.

How to use the Suns Declination, thereby to find out the Elevation of the Pole.

TO find out the Altitude or height of the Pole in any several Latitude, viz. How much the Pole is raised above your Horizon in degrees and minutes. It is necessary; first, to take by observation the meridian Altitude of the Sun, which meridian Altitude is known, by taking the height of the Sun that day, in which you would observe, just at noon, at which time the Sun is highest, being then also upon y meridian: which found, note it down in paper or slate: then knowing the year of our Lord, with the month in which you are; and also the day of the moneth, look in the Kalender before spoken of, for the moneth and day thereof, and right against the said day of the moneth, towards the right hand, under the title Suns Dec. you shall see the several years, which the said Table of Declination serves for. If it be the Leap-year look in the last of the said 4 Tables under the title Leap-year: If it be the first after Leap-year, then

then resort to the first of the said Tables under the title First; so of the second & third; and after those 4 years are past, come back again to the first, and proceed as you did before: then (as I said) having found out the Month, Day, & Year, direct your eye downward toward the foot of ỳ Table, in the Table which serves for the yeare propoled, til ỳ find a number making a right angle to the day of your month: or more plainly, look what number in the last Column of your year is right against ỳ day of your month, which numbers are the Declination for the day desired: & there being two numbers in the said Column; the first are degrees, the other min: then regard also whether the Sun hath North Declination or *South* Declination, which is set down between the severall spares: where by the way ỳ shall note, that from the Suns entrance into Aries, which is about the 11 of *March*, till his entrance into Libra, which is about the 13 of September, he hath North Declination, & from the said 13 of September, till his enterance into Aries, again, South Declination: the said declination increasing, according to the Suns progress through the Signs, from his entrance into Aries, till his entrance into Cancer, & decreasing from Cancer, to the beginning of Libra, then again increasing from Libra to Capricorn, & decreasing from Capricorn to the end of Pisces, & beginning of Aries. Aries, Taurus, Gemini, Cancer, Leo & Virgo, being Signs having North Declination from the Equinoctial Circle: and Libra, Scorpio, Sagitarius, Capricornus, Aquarius, & Pisces, South Signs, having such Declination from that Circle: then knowing (as I have said) the Meridian Altitude of the Sun, the Declination of the Sun, and whether the Sun hath South or North Declination; as these three things are always to be considered in knowing the height of the Pole. If the Declination be North, subtract the Declination from the meridian Altitude, the remainer is the Elevation of the intersection, or cutting of the Equinoctiall with the Meridian above the Horizon: which in common terms is the Elevation of the Equinoctial above the Horizon: which height of ỳ Equinoctial taken from 90, leaveth the height of the Pole, or the Latitude of the place of your observation. But contrariwise, if the Sun have South Declination, adde the said Declination to the Meridian Altitude, the Product is the height of ỳ Equino-

cial, which likewise taken from 90, leaveth also the height of the Pole.

Example.

I observed the 11 of July, 1660, in the City of London, and found the Meridian Altitude of the Sun to be 62 degrees, and ẏ Declination of the Sun North 23 d. 32 m. Now being that the Declination was North, I subtracted it from the height of the Sun at noon: the remainder was 38 deg. 28 m. the hight of the Equinoctial: that taken from 90, leaves 51 degr. 32 min. for the hight of the Pole, or Latitude of London.

This Rule is to be understood when you are between ẏ Equinoctiall & the North Pole, and ẏ Sun to the Southward of you: But if you should be between the Equinoctial & the South Pole, and the Sun North from you; then you must work contrary: for then if the Sun hath South Declination, you must subtract the Declination from the Meridian Altitude; and if the Sun hath North Declination, you must adde the said Declination to the Meridian Altitude.

As for Example.

Being at Sea to the Southwards of the Line the 4 of January 166⅔, suppose that you observe the height of the Sun at noon, & find it to be 66 deg. 24 m. then you shall find the Declination to be 21 deg. 20 min. to the Southwards, which subtracted from 66 deg. 24 min. the Meridian altitude, leaves 45 deg. 4 min. for the height of the Equinoctial: that taken from 90, rests 44 deg, 56 min. for the height of the South Pole above the Horizon.

Again, suppose that being at Sea the 10 of May 1660, and observing the Sun, you take the Altitude at noon 60. deg. 30. min. & his declination then is 20 deg. 15 min. Northwards, but then not having observed long before you know not whether you are to the Northwards of ẏ Equinoctial, or to the Southwards of the said line: to know which, set the Sun by your Compass, and mark which way the shadow of the Sun streketh: for if he casteth his shadow the same way that the Declination is, then is the Sun betwixt the Equinoctial and you, your self being also the same way that the Suns Declination is: and therefore subtracting the Declination 20 deg. 15 min. from 60 deg. 30 min. the Meridian Altitude, rests 40 deg. 15 min. the hight of the Equinoctial, the complement whereof 49 deg. 45 min. is the Elevation of the North Pole: but if the Sun casts his shadow contrary to his declinati on.

clination, ẏ is to say, It having North Declination, his shadow goeth Southward or having South declination, it cast his shadow Northward: Then either the Equinoctial shall be betwixt you & the Sun, or you in the Equinoctial; or else you shall be betwixt ẏ Equinoctial and the Sun: which to know, adde the Declination and the Meridian Altitude for the day proposed together: If the sum of the Addition be lesse then 90 deg. so much as it wanteth of 90 deg. shall you be distant from the Equinoctial that way ẇ the shadow streeketh: If it be just 90 deg. then are you under the Equinoctial. Again if your said Meridian Altitude and Declination aded passeth 90 deg. then so much as is overplus you shall be from the Equinoctial towards the Sun, and then also shall you be betwixt the Equinoctial and the Sun, & if you finde the Sun to be in your Zenith, so much as is the Declination shall ẏ be from the Equinoctial that way that the Sun declineth: By which reason, if the Sun be in your Zenith, that is 90 d. high, and hath no Declination, then are you under the Equinoctial

How to appropriate the Tables of Declination to any other Meridian

There is in the oft using the Suns Declination, one principal thing to be considered, which is, that a Table of Declination made for any particular place, doth not serve generally for all places, but onely for such places as have the like, or neer the same Longitude. The reason is, because that ẏ Declination is calculated according to the true place of ẏ Sun at noon, at ẇ time the Sun is upon the Meridian at that place, for which ẏ said Tables are made: but you must note ẏ the Sun doth not come to ẏ Meridian in all places at a like time, although that in all places the Sun being upon the Meridian makes the middle of ẏ day. But for every 15 degrees difference of Longitude between any two places the Sun comes sooner or later to the Meridian, by so many houres. So that if a place be 15 degrees to ẏ Eastward of the place prefixed, then ẏ Sun comes sooner to ẏ meridian by an houre, & if it be 15 degr. to the Westward, later by an houre. And so consequently more or lesse according to the difference of Longitude. By which reason, in what part of ẏ world soever you be, ẏ may work for ẏ Declination of the Sun in that place by ẏ proportional parts of 24 hours declina. to ẏ hours of diff. in Longit.

Example, Being in Brasilia (a part of the West. Indies) ẏ 10 of

April 1650, whose meridian is distant from ẏ meridian of England to ẏ westward about 45 degrees, which is 3 hours of time, ẏ the Sun should come to ẏ Meridian later there then here at London where ẏ Table is made: For when it is 12 a clock here, it is but 9 there; & being noon there, it is 3 a clock here. Therfore to apply this Table to that place, I find ẏ declination for ẏ day aforesaid, under our meridian to be 11 deg. 55 min. at noon, & by reason ẏ when it is 12 a clock at Brasilia, it is then at London 3 hours past. Therfore, by ẏ Rule of proportion, I seek what declination the Sun hath at 3 a clock in ẏ afternoon, as followeth; I take ẏ difference of the declination between the day aforesaid, & the next following, which is 20 min. then I say, by the rule of 3, if 24 hours gives 20 min. what gives 3 hours, the time of ẏ difference in Longitude? Facit 2 min. and 30 seconds, which (because the declination increases) I adde to the number of ẏ day proposed: so I conclude, ẏ declination of the Sun to be the 10 of April at noon in the Kingdom of Brasilia 11 deg. 57 min. & a half.

Again, the day and time aforesaid, in the Bay of St. Sebastian whose Longitude is 58 deg. to ẏ Eastward of London, answering nèr to 4 hours of time, shewing ẏ the Sun comes sooner to the meridian in the Bay of St. Sebastian, by 4 hours then at Londn, by which reason the declination is less there then at London, because the declination doth increase: For if the declination did decrease, it would be more there, than at London, and to know the declination of the Sun in the Bay aforesaid: Take the difference betwixt the declination of ẏ 10 of April, & the declination of the day nerthefore, being 20 minutes. Then (I say) if 24 hours give 20 min. what 4 hours? Facit 3 min. 20 sec. which deducted from 11 deg 55 min. the Declination of the Sun the 10 of April aforesaid at London, leaveth 11 deg. 51 min. 40 sec. The Declination of the Sun at noon in the Bay of St. Sebastian, being that when it is 12 of the clock there, it is but 8 a clock at London, or in any place having the same Longitude. Because this appropriating of the Declination, to any other Meridian is so necessary, I have first in the Kalender, set down the daily difference of the declination between the two Sections in either page, & with all differently serve for both; And I have also added this Table of proportion, for your more ready finding how much you must adde

to,

to or subtract from the Declination in the Kalender. The work is the same as in the former Example only this Table will save your labour in working by the Rule of Three, and so needs no farther Example.

A Table to proportion the Suns Declinations to any time of the day or to any other Meridian.

The dayly difference of the Declination being.

Minutes	2	4	6	8	10	12	14	16	18	20	22	24
	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
1	5	10	15	0 20	0 25	0 30	0 35	0 40	0 45	0 50	0 55	1 00
2	10	20	30	0 40	0 50	1 00	1 10	1 20	1 30	1 40	1 50	2 00
3	15	30	45	1 00	1 15	1 30	1 45	2 00	2 15	2 30	2 45	3 00
4	20	40	2 00	1 20	1 40	2 00	2 20	2 40	3 00	3 20	3 40	4 00
5	25	50	1 15	1 40	2 05	2 30	2 55	3 20	3 45	4 10	4 35	5 00
6	30	1 00	1 30	2 00	2 30	3 00	3 30	4 00	4 30	5 00	5 30	6 00
7	35	1 10	1 45	2 20	2 55	3 30	4 05	4 40	5 15	5 50	6 25	7 00
8	40	1 20	2 00	2 40	3 20	4 00	4 40	5 20	6 00	6 40	7 20	8 00
9	45	1 30	2 15	3 00	3 45	4 30	5 15	6 00	6 45	7 30	8 15	9 00
10	50	1 40	2 30	3 20	4 10	5 00	5 50	6 40	7 30	8 20	9 10	10 00
11	55	1 50	2 45	3 40	4 35	5 30	6 25	7 20	8 15	9 10	10 05	11 00
12	1 00	2 00	3 00	4 00	5 00	6 00	7 00	8 00	9 00	10 00	11 00	12 00

The hours from noon, or difference of Meridian E. or W.

How to observe the height of the Pole by the Stars.

The working thereof by the Stars to finde the height of the Pole, is all alike with the working thereof by the Sun, for if you observe any Star upon the Meridian: look in the Table of the fixed Stars for the name of the Star which you observed, where you shall finde his Declination either North or South, & the right Ascension thereof in deg. & hundred parts, having taken for Altitude of any Star upon the Meridian, you have nothing to mark in the Table for this, but the Declination, if it be North, take the Declination of the Star from the height thereof: The remainder taken from 90, leaveth the height of the Pole: but if the Star hath South Declination, adde the declination to the Altitude taken, and the amount thereof taken from 90, leaves the height of the Pole: Also to finde the time of any Stars coming to the

the Meridian, is set down after the Tables of the Suns right Ascention, but for the first day of every moneth, you have it in the Table of the Stars Example.

The 25 of November, I observed a Star of the second bignesse in the wing of Pegasus, or the Flying Horse about 8 a clock in the evening and found the Meridian Altitude thereof to be 51 deg. 52 min. & in the Table of the fixed Stars, I finde the said Star to have 13 deg. 24 min. Northy Declination: which taken from 51 deg 45 min. the height observed leaves 38 deg. 28 min. the height of the Equinoctial, the complement whereof 51 deg. 32 min. is the height of the North Pole at London.

And so consequently, for all those Stars whose declination is taken from the Equinoctial: but for those Stars which are any thing neer to the Pole, whose distance or Declination is counted from the Pole, their working is thus: You must note, that being far to the Northward, some of those Stars will be twice upon y meridian, viz. once above the Pole, and once under the Pole: therefore if you observe any Star upon the meridian under the Pole adde the distance of the said Star from the Pole to your Altitude observed, the total is the height of the Pole: but if you observe any Star upon the meridian above the Pole. so much as is the distance or declination of the said Star from the Pole, you must take from the Altitude taken, the remainer is the hight of the Pole. As for Example.

If at London you observe the former Guard Star beneath the Pole upon the meridian, you shall finde it to be 37 deg. 16 min. to which if you adde 14 deg. 22 min the distance of the said Star from the Pole: y total is 51 deg. 32 min. the height of the North Pole at London. Again, the same Star observed upon the meridian above the Pole is 65 deg. 54 min. from which 14 deg. 22 min the distance aforesaid taken, leaveth 51 deg. 32 min. as before.

Note that being far Northward, those Stars between the Equinoctial and Tropick of Cancer are best to observe, and being between the said Tropick & the Equinoctial, those Stars above the Pole are fittest for observation, and for those that travel far beyond the Line to the Southwards, the like order must be kept by the Stars between the Equinoctial, and the Tropick of Capricorn, and those that are neer the South Pole.

Of

Of the North Star.

Whereas the North Star being very neer the Pole, (and by report) is of most Seamen made much use of for observation in our Northern Navigations, considering the great use that hath been made thereof, there hath formerly been two Tables set forth for this purpose; the one after a more general way, as supposing, little or no difference in any Latitude; the other with some allowance for the difference of the height of this Star in several Latitudes; which though it be not much; for it is but 3 min. in the Latitude of 40 deg. and but 4 min. in the latitude of 50 degrees, & but 6 min. in the Latitude of 60 deg. (which is as far as these observations can well be used) yet this difference is not to be neglected, & therefore here I have joyned both Tables in one, having corrected them according to the true Decl'n. of this Star from the Pole, for the year 1660, which is 1 deg. 30 min.

But herein take special notice, how you must reckon these points of the Compasse, which in the old Tables was not well directed, for they reckon the points of the Compass upon their Nocturnals, just as they are in the figures of the Compass, page 9. which though it shews the true position of them, as it lyes flat, yet is very false and absurd when the instrument is held up for observation.

Therefore in this Table I begin at that part of the Meridian which lies directly under the Pole, which may most properly be called the North, and so proceed point by point, as the Guard and the other Stars make their revolution about the Pole, ascending from this lowest or North point of the Meridian, to the Northeast, and so to the East and from thence to the Southeast, and so to the South, or highest point of their ascending, being directly over the Pole: From this South or highest point they descend again by the West, and so return to the North againe.

Yet because some have scrupled hereat being used to the other way, I have also in the last Column set the points of the Compasse according to the old way, so that you may use which you shall best

Lastly, take this as a general rule to guide you and to prevent mistakes; That the first of the Guards of the little Beare which is the Star you are to observe, is almost in an opposition to the Pole Star: So that when the Guard Star is under the Pole; then the Pole Star is above the Pole, and when the Guard Star is above the Pole, then the Pole Star is under the Pole so many degrees and minutes as the Table shews you

The use of this Table is thus, when you would observe the altitude of the North Star, mark as neer as you may (or rather observe with a Nocturnall made on purpose,) upon what point of the Compasse the former Guard of the little Bear is, (reckoning the points of the Compasse thereon, according to the foresaid rules,) and if the said Star be not just upon a full point of the Compasse, then stay a little longer, till it come to some one of them, and then observe the height of the Pole Star as exactly as you can. Then by the way of your Ship, knowing within a degree or two what latitude you are in, consider which of these Latitudes set down in the top of the Ta-

ble, is that which you are nearest to and use that. And now if you finde the Point of the Compasse which the Guard Star is upon, in the first column of the Table, in that very line under the column of your Latitude, you shall finde how many degrees and minutes, the Pole Star is either above or below the Pole, according to the direction of the last column of the Table, which you must thus make use of. If the Star be any thing above the Pole, substract the number in the Table, from the height of the Star observed: but if the Star be under the Pole, then adde the number found in the Table to the height observed and so you shall have the true height of the Pole.

Thus if (without having any respect to the Latitude) you shall see the Guard Star to be just Northeast from the Pole Star, and by observation find the height thereof to be 50 deg. 0 min look out this point Northeast in ye Table, and against it in ye next column marked (0) Latitude) you shall find that the Star is 0 deg 39 min above the Pole and this now substracted from the foresaid height 50 deg there rests 49 deg, 21 min, for the height of the Pole

But if you will be more exact, and have respect to the Latitude which you are in, which you may suppose to be about 50 deg, then look in this line of Northeast for the Column under 50, & there you shall find that the Pole star is only 35 min, above the Pole, & this substracted from the foresaid height of 50 degrees shewes the true latitude to be 59 deg 25 min. which differs 4 min, from the former, and is so much the more exact.

But if the Guard Star had been Southwest, then the Pole Star had been 39 min, (or more exactly) 44 min under the Pole which being aded to the height 50 deg, the Latitude should be 50 degrees, 39 minutes, or more exactly 50 degrees, 44 minutes

And now having made plain unto you the use, and profit of the said Table, it being indeed so necessary & commodious for the Mariners use as any rule whatsoever: it resteth now to speak somewhat more particularly of the other fixed Stars set down in ye Tables following wherein are in the first Page 12 Colums, the first is the number of the Stars, which are 65, the second is their Names, the third is their Magnitudes, either the 1, 2, or 3, Magnitudes, the fourth is their Right Ascentions in degrees & hundred parts, the fifth is the Difference of their Right Assentions, for 100 years, the sixt is their Declination in degrees and min, the seventh is the name of their Declination, S, signifiing South, and N, signifying North, the eighth is their Difference of their Declination for 100 years, The ninth sheweth whether their difference of declination be to be aded or substracted A, signifying to adde, and S, to substract. In the tenth their right assention in houres and 100 parts for the knowing the houre of the night at any time, In the two last Columns, and so along over the second page at the top of the Column, are the names of the 12 Moneths, and under them in the Columns of every Month are the Hours, and hundred parts of an houre, that any of these Stars come to the Meridian the first day of every moneth the letter M. sheweth the houre to be between Midnight and noon, & the letter sheweth the houre to be between noon and Midnight Next after the Table of the Stars follows a Table of the Complement of the Suns Right Ascension in hours and hunder parts, the use of which Tables followes after the Tables.

A Table of the North Star.

In these several Latitudes.

The true Poi. of the Compass.	0		20		30		40		50		60		70		Of Declination.	The old way of reckoning the Points of the Compass.
	D.	M	D.	M	D.	M	D.	M	D.	M	D.	M	D.	M		
North	2	10	2	10	2	10	2	09	2	09	2	8	2	7	South	South
N by E	1	53	1	53	1	53	1	52	1	51	1	51	1	49	S by W	S by E
N NE	1	31	1	31	1	30	1	30	1	29	1	28	1	25	S S W	S S E
ne by n	1	6	1	5	1	4	1	03	1	02	1	1	0	58	s e by s	
N E	0	39	0	38	0	37	0	36	0	35	0	33	0	30	S W	S E
ne by e	0	10	0	9	0	8	0	07	0	06	0	4	0	1	s e by e	
E N E	0	18	0	19	0	20	0	21	0	22	0	23	0	26	E S E	E S E
E by N	0	49	0	50	0	50	0	51	0	52	0	53	0	56	E by S	E by S
East	1	15	1	15	1	16	1	17	1	18	1	19	1	21	East	East
E by S	1	38	1	39	1	39	1	40	1	41	1	42	1	44	E by N	E by N
E S E	2	0	2	0	2	0	2	00	2	01	2	02	2	2	E N E	E N E
se by e	2	15	2	15	2	15	2	15	2	16	2	16	2	16	n e by e	
S E	2	25	2	25	2	25	2	25	2	25	2	25	2	25	N E	N E
se by s	2	30	2	30	2	30	2	30	2	30	2	30	2	30	n e by n	n e by n
S S E	2	29	2	29	2	29	2	29	2	29	2	29	2	29	N N E	N N E
S by E	2	22	2	22	2	22	2	22	2	22	2	22	2	22	N by E	N by E
South	2	10	2	10	2	10	2	11	2	11	2	11	2	12	North	North
S by W	1	58	1	58	1	54	1	53	1	55	1	55	1	57	N by W	N by W
S S W	1	31	1	32	1	32	1	33	1	34	1	35	1	38	N N W	N N W
s w by s	1	7	1	7	1	8	1	9	1	10	1	11	1	13	n w by n	
S W	0	39	0	40	0	41	0	40	0	43	0	44	0	47	N W	
sw by w	0	10	0	11	0	12	0	13	0	14	0	16	0	19	n w by w	
W S W	0	19	0	18	0	19	0	16	0	15	0	13	0	10	W N W	W N W
W by S	0	48	0	47	0	46	0	45	0	44	0	43	0	42	W by N	W by N
West	1	15	1	14	1	14	1	12	1	11	1	10	1	08	West	West
W by N	1	39	1	39	1	38	1	37	1	36	1	33	1	31	W by S	W by S
w n w	2	00	1	59	1	59	1	58	1	58	1	57	1	56	w s w	w s w
n w by w	2	15	2	15	2	14	2	14	2	14	2	13	2	12	s w by w	s w by w
N W	2	25	2	25	2	25	2	25	2	25	2	24	2	24	S W	S W
n w by n	2	30	2	30	2	30	2	30	2	30	2	30	2	30	s w by s	s w by s
N N W	2	29	2	29	2	29	2	29	2	29	2	29	2	29	S S W	S S W
N by W	2	22	2	22	2	22	2	22	2	22	2	21	2	21	S by W	S by W

If the former of the Guards be ascending from the North or lower part of the Meridian.

If the former of the Guards be descending from the South or upper part of the Meridian.

Above the Pole. Under the Pole. Above the Pole.

The *Right Ascension* and *Declination* of 65 of the principal
Moneth, with the difference of their Right

Number.	For the year 1660. *Names.*	Magnitude.	Right Ascension.	Dif. 100 year	declination	N or S	Diff. 100 year	Righ Ascension.	January	February
			H. pts.	d. pt.	D M		M	H. pts.	H. pts. A	H. pts. A
1	North in Whales tail	3	00 60	1 30	10 41	S	34	S 0 04	4 48	2 34
2	South in Whales tail	2	06 62	1 27	19 51	S	34	S 0 44	4 88	2 74
3	Pole star [Girdle	2	08 19	1 82	87 30	N	34	A 0 55	4 90	2 76
4	South in *Andromeda's*	2	12 67	1 39	33 52	N	33	A 0 84	5 29	3 15
5	In *Cassiopeia's* knee	3	16 02	1 58	58 27	N	33	A 1 7	5 50	3 36
6	South in Rams horn	3	23 77	1 38	17 38	N	31	A 1 58	6 03	3 88
7	North in Rams horn	3	23 98	1 37	19 09	N	31	A 1 60	6 03	3 89
8	Rams head [jaw	3	27 07	1 42	21 51	N	30	A 1 80	6 23	4 09
9	Brightest in Whales	2	41 17	1 25	02 44	N	25	A 2 75	7 18	5 04
10	Head of *Medusa*	2	41 60	1 61	39 37	N	25	A 2 77	7 21	5 07
11	*Perseus* right side	2	44 92	1 47	48 35	N	21	A 2 99	7 45	5 29
12	After in *Perseus* left	3	53 29	1 57	30 52	N	20	A 3 55	7 99	7 85
13	Bulls eye [foot	1	64 15	1 45	15 47	N	10	A 4 28	8 71	6 57
14	The Goat, *Hircus*	1	72 75	1 81	45 36	N	10	A 4 85	9 29	7 15
15	*Orions* left foot	1	74 62	1 25	08 37	S	09	S 4 97	9 40	7 26
16	*Orions* left shoulder	2	76 77	1 35	06 09	N	07	A 5 12	9 55	7 41
17	First in *Orions* Girdle	2	78 74	1 28	00 35	S	07	S 5 25	9 66	7 52
18	Wagons right shoulder	2	83 82	1 92	44 52	N	04	A 5 59	10 35	8 21
19	*Orions* right shoulder	2	84 27	1 37	07 18	N	04	A 5 62	10 07	8 91
20	Brightest in *Pollux* feet	2	94 52	1 47	16 39	N	02	S 6 30	10 74	8 60
21	Great Dog	1	97 55	1 14	16 33	S	04	6 50	10 94	8 80
22	First head of *Gemini*,	2	108 20	1 74	32 34	N	11	S 7 21	11 65	9 51
23	Little Dog [*Taster*	1	110 42	1 35	06 05	N	12	S 7 36	11 80	9 66

fixed Stars, & their coming to South the first day of every *Ascension* and *Declination* for 100 Years.

Marc.		April		May		June		July		Aug-ust		Septe mber.		Octo ber.		Nove-mber		Dece-mber.		Numbers.
H	pts	H	pts	H	pts	H	pts	H	pts	H	pts	H	pts	H	pts	H	pts	H	pts	
	A		M		M		M		M		M		M		A		A		A	
0	57	10	69	8	81	6	72	4	65	2	62	0	72	10	91	8	92	6	78	1
0	97	11	09	9	21	7	12	5	05	3	02	1	12	11	31	9	32	7	18	2
0	99	11	11	9	23	7	14	5	07	3	04	1	14	11	33	9	34	7	20	3
1	38	11	50	9	62	7	53	5	46	3	43	1	53	11	72	9	73	7	59	4
1	59	11	71	9	83	7	74	5	67	3	64	1	74	11	93	9	97	7	80	5
		A												M						
2	11	0	23	10	35	8	26	6	19	4	16	2	26	0	45	10	46	8	32	6
2	12	0	24	10	36	8	27	6	20	4	17	2	27	0	46	10	47	8	33	7
2	32	0	44	10	56	8	47	6	40	4	37	2	47	0	66	10	67	8	53	8
3	27	1	39	11	51	9	42	7	35	5	22	3	42	1	61	11	62	9	48	9
3	30	1	42	11	54	9	45	7	38	5	35	3	45	1	64	11	65	9	51	10
3	52	1	64	11	76	9	67	7	60	5	57	3	67	1	86	11	67	9	73	11
				A												M				
4	08	2	20	0	32	10	23	8	16	6	13	4	23	2	42	0	43	10	29	12
4	80	2	92	1	04	10	95	8	88	6	87	4	95	3	14	1	15	11	01	13
5	38	3	50	1	62	11	53	9	46	7	43	5	53	3	72	1	73	11	59	14
5	49	3	61	1	73	11	64	9	57	7	54	5	64	3	83	1	84	11	70	15
5	64	3	76	1	88	11	79	9	72	7	69	5	79	3	98	1	99	11	85	16
5	75	3	87	1	89	11	90	9	83	7	80	5	90	4	09	2	10	11	56	17
						A												M		
6	44	4	56	2	68	0	59	10	52	8	49	6	59	4	78	2	79	0	65	18
6	14	4	26	2	38	0	29	10	22	8	19	6	39	4	48	2	49	0	35	19
6	83	4	95	3	07	0	96	10	98	8	88	6	98	5	17	3	18	1	04	20
7	03	5	15	3	27	1	18	11	11	9	08	7	18	5	37	3	38	1	24	21
7	74	6	86	3	98	1	89	11	82	9	79	7	89	6	08	4	09	1	91	22
7	89	6	01	4	13	2	04	11	97	9	94	8	04	6	23	4	42	2	10	23

The *Right Ascension* and *Declination* of 65 of the principal Moneth, with the difference of their Right

Number,	For the year 1660. *Names.*	Magnitude,	Right Ascension, D. pts.	Dif. 100 year d. pt.	declination. D M	N or S	Diff, 100 year M		Right Ascension H pts	January H pts A	February H pts A
24	Secōdhead *Gemi. Castor*	2	111 17	1 59	28 48	N	12	S	7 41	11 84	9 70
25	Souther. Arm, the Crab,	3	129 97	1 39	13 8	N	22	S	8 66	M 1 10	10 96
26	*Hydraes* heart	1	137 77	1 25	7 12	S	25	A	9 18	1 62	11 48
27	Lyons heart	1	147 59	1 37	13 36	N	29	S	9 84	2 27	M 0 13
28	Lyon neck, highest	2	149 43	1 47	25 5	N	29	S	9 96	2 35	0 21
29	Great Bears side	2	160 17	1 62	58 12	N	32	S	10 68	3 11	0 97
30	Great Bears back	2	160 64	1 67	63 35	N	33	S	10 71	3 14	1 00
31	Lyons back	2	164 03	1 45	22 22	N	34	S	10 94	3 36	1 22
32	Lyons tail	1	172 95	1 33	16 28	N	34	S	11 53	3 97	1 83
33	Great Bears thigh	2	173 89	1 38	55 36	N	34	S	11 60	4 3	1 89
34	First in Ravens wing	3	179 88	1 3	15 37	S	34	A	11 99	4 43	2 19
35	First in Great Bears tail	2	189 72	1 15	57 50	N	34	S	12 65	5 9	2 95
36	Virgins Spike	1	196 87	1 32	9 21	S	33	A	1 12	5 56	3 42
37	Secōd in great Bears tail	2	197 54	1 4	56 44	N	33	S	1 17	5 61	3 47
38	Third in great Bears tail	2	203 52	1 3	51 3	N	30	S	1 57	6 1	3 87
39	*Centaura* right shoulder	3	206 73	1 48	35 16	S	30	A	1 78	6 22	4 8
40	Arcturus	1	210 10	1 20	21 1	N	30	S	2 1	6 45	4 31
41	South Ballance	2	218 08	1 39	14 34	S	27	A	2 54	6 97	4 83
42	Formost Guard	2	222 82	1 17	75 38	N	25	S	2 85	7 32	5 18
43	North Ballance	2	224 74	1 35	8 5	S	24	A	2 98	7 37	5 23
44	Brightest North Crown	2	230 8	1 7	27 53	N	22	S	3 34	7 78	5 64

fixed Stars, & their coming to South the first day of every *Ascension* and *Declination* for 100 Years.

Marc.	April	May	June	July	August.	September.	October.	November.	December.	Number.
H. pts.	H. pts	H. pts	H. pts	H. pts	H. pts	H. pts	H. pts.	H. pts.	H. pts.	
A	A	A	A	A	M	M	M	M	M	
7 93	6 5	4 17	2 8	0 1	9 98	8 8	6 27	4 28	2 14	24
9 19	7 31	5 43	3 24	1 27	11 24	9 34	7 53	5 54	3 40	25
9 71	7 83	5 95	3 86	1 79	11 76	9 86	8 5	6 6	3 92	26
					A					
10 36	8 48	6 60	4 51	2 44	0 41	10 51	8 79	6 71	4 57	27
10 44	8 56	6 68	4 59	2 52	0 49	10 59	8 78	6 79	4 65	28
11 20	9 32	6 44	5 35	3 28	1 25	11 35	9 54	7 55	5 41	29
11 23	9 35	7 47	5 38	3 31	1 28	11 38	9 57	7 58	5 44	30
11 45	9 67	7 69	5 60	3 53	1 50	11 60	9 79	7 80	5 66	31
M						A				
0 6	10 18	8 30	6 21	4 14	2 11	0 21	10 40	8 41	6 27	32
0 12	10 24	8 36	6 27	4 20	2 17	0 27	10 46	8 47	6 33	33
0 52	10 64	8 76	6 67	4 60	2 57	0 67	10 86	8 87	6 74	34
1 18	11 30	9 42	7 33	5 26	3 23	1 33	11 52	9 53	7 39	35
1 65	11 77	9 89	7 80	5 73	3 70	1 80	11 99	10 00	7 86	36
							A			
1 70	11 82	9 94	7 85	5 78	3 75	1 85	0 4	10 5	7 91	37
	M									
2 10	0 22	10 34	8 25	6 18	4 15	2 25	0 44	10 45	8 31	38
2 31	0 43	10 55	8 46	6 39	4 36	2 46	0 65	10 66	8 51	39
2 54	0 66	10 78	8 69	6 62	4 56	2 66	0 88	10 89	8 75	40
3 6	1 18	11 30	9 21	7 14	5 11	3 21	1 40	11 41	9 27	41
3 41	1 53	11 65	9 56	7 49	5 46	3 56	1 75	11 76	9 62	42
3 46	1 58	11 70	9 61	7 54	5 51	3 61	1 80	11 81	9 67	43
		M						A		
3 87	1 99	00 11	10 2	7 95	5 92	4 02	2 21	10 22	10 8	44

The *Right Ascension* and *Declination* of 65 of the principal Moneth, with the difference of their Right

Number	For the year 1660. *Names.*	Magnitude	Right Ascen. sion.	Dif. 100 year	decli- nati- on.	N or S	Diff. 100 year	Right Ascen sion	January	February
			D. pts.	d. pt.	D M		M	H pts	H pts M	H pts A
45	Brigteſt of Serpēts neck	2	231 95	1 23	07 33	N	21 S	3 46	7 91	5 77
46	Hinder Guard, *Subi*	2	231 30	0 30	73 16	N	20 S	3 42	7 87	5 73
47	Scorpions heart	1	242 22	1 55	25 36	S	16 A	4 15	8 58	6 44
48	Serpentarius right knee	3	252 33	0 83	15 13	S	10 A	4 82	9 29	7 15
49	Hercules head	2	254 79	1 13	14 50	N	08 S	4 99	9 43	7 29
50	Sagittarius arrow head	3	266 22	1 62	30 00	S	02 A	5 75	10 18	8 04
51	Dragons head	3	267 21	0 83	51 36	N	04 A	5 81	10 26	8 12
52	The Harp	1	276 37	0 85	38 30	N	04 A	6 43	10 87	8 73
53	Swans bill	3	289 29	1 03	27 17	N	12 A	7 29	11 73	9 56
54	Sagittarius left thigh	3	293 50	1 67	35 27	S	14 S	7 57	11 00 A	9 86
55	Vultures heart, *Alkair,*	3	293 58	1 28	08 02	N	14 A	7 57	0 01	9 87
56	Swans tail	2	307 48	0 86	44 06	N	20 A	8 50	0 94	10 80
57	Dolphins head	3	307 76	1 19	14 57	N	21 A	8 52	0 96	10 82
58	Pegaſus mouth	3	321 95	1 30	08 21	N	26 A	9 46	1 90	11 76
59	Laſt in tail Capricorn	3	322 12	1 41	17 35	S	27 S	9 48	2 91	11 77 M
60	Fomahant	1	339 62	1 42	31 20	S	31 S	10 64	3 08	0 94
61	Pegaſus right ſhoulder	2	341 87	1 20	26 15	N	32 A	10 79	3 26	1 09
62	Pegaſus wing [*Scheat*	2	342 00	1 16	13 24	N	32 A	10 80	3 24	1 40
63	Head of Andromeda	2	357 70	1 29	27 14	N	34 A	11 85	4 20	2 15
64	Briteſt *Caſſiopeia's* Chair	3	357 83	1 27	57 18	N	33 A	11 86	4 20	2 15
65	Pegaſus wing Tip, *Scheat*	2	359 00	1 27	13 18	N	33 A	11 93	4 39	2 25

fixed ſtars, & their coming to South the firſt day of every *Aſcenſion* and *Declination* for 100 Years.

March		April		May		June		July		August		September		October		November		December		Number
H.	pts.	H.	pts.	H.	pts.	H.	pts.	H.	pts.	H.	pts.	H.	pts.	H.	pts.	H.	pts.	H.	pts.	
	M		M		M		A		A		A		A		A		A		M	
4	00	2	12	0	24	10	15	8	08	6	05	4	15	2	34	0	35	10	21	45
3	96	2	08	0	29	10	11	8	04	6	01	4	11	2	30	0	31	10	17	46
4	67	2	79	0	91	10	82	8	75	6	72	4	82	3	01	1	02	10	88	47
5	38	3	50	1	62	11	53	9	46	7	44	5	54	3	72	1	73	11	59	48
5	52	3	64	1	76	11	67	9	60	7	58	5	68	3	86	1	87	11	73	49
							M												A	
6	27	4	39	2	51	0	42	10	35	8	32	6	42	4	62	2	62	0	48	50
6	35	4	47	2	59	0	50	10	43	8	40	6	50	4	68	2	70	0	56	51
6	96	5	08	3	20	1	11	11	04	9	01	7	11	5	30	3	31	1	17	52
7	82	5	94	4	06	1	97	11	90	9	87	7	97	6	16	4	17	2	03	53
									M											
8	09	6	21	4	33	2	24	0	17	10	14	8	24	6	43	4	44	2	30	54
8	10	6	22	4	34	2	25	0	18	10	15	8	25	6	44	4	45	2	31	55
9	03	7	15	5	27	3	18	1	11	11	08	9	18	7	37	5	38	3	14	56
9	05	7	17	5	29	3	20	1	13	11	10	9	20	7	39	5	40	3	20	57
											M									
9	99	8	11	6	23	4	14	2	07	0	04	10	14	8	33	6	44	4	20	58
0	00	8	12	6	24	4	15	2	08	0	05	10	15	8	34	6	35	4	21	59
11	17	9	29	7	41	5	32	3	25	1	22	11	32	9	51	7	52	5	38	60
11	32	9	44	7	56	5	47	3	40	1	37	11	47	9	66	7	67	5	53	61
11	33	9	45	7	57	5	48	3	41	1	38	11	48	9	67	7	68	5	54	62
	A												M							
10	38	10	50	8	62	6	53	4	46	2	43	00	53	10	72	8	73	6	59	63
00	38	10	50	8	62	6	53	4	46	2	43	00	53	10	72	8	73	6	59	64
00	48	10	60	8	74	6	63	4	56	2	53	00	63	10	82	10	83	6	67	65

A Table of the Complement of the Suns right Ascension, for every day at midnight, in hours, and hundred parts.

Dais	January		Febru.		March		April.		May.		June.	
	H.	pts.	H.	pts.	H.	pts.	H.	pts.	H.	pts.	H.	pts.
1	4	40	2	27	0	50	10	62	8	73	6	64
2	4	33	2	21	0	44	10	56	8	67	6	57
3	4	26	2	14	0	37	10	49	8	60	6	50
4	4	18	2	8	0	31	10	43	8	54	6	43
5	4	11	2	1	0	25	10	37	8	47	6	36
6	4	5	1	95	0	19	10	31	8	40	6	29
7	3	98	1	88	0	13	10	25	8	34	6	23
8	3	90	1	82	0	7	10	19	8	27	6	16
9	3	83	1	76	0	1	10	12	8	21	6	9
10	3	76	1	69	11	95	10	6	8	14	6	2
11	3	69	1	63	11	89	10	0	8	7	5	95
12	3	62	1	56	11	83	9	94	8	1	5	88
13	3	55	1	50	11	77	9	88	7	94	5	81
14	3	48	1	44	11	71	9	81	7	87	5	74
15	3	41	1	38	11	65	9	75	7	80	5	66
16	3	34	1	31	11	59	9	69	7	74	5	60
17	3	27	1	25	11	53	9	63	7	67	5	53
18	3	20	1	19	11	47	9	56	7	60	5	46
19	3	13	1	13	11	41	9	50	7	53	5	39
20	3	7	1	6	11	34	9	44	7	47	5	33
21	3	0	1	0	11	28	9	38	7	40	5	26
22	2	93	0	94	11	22	9	31	7	33	5	19
23	2	86	0	88	11	16	9	25	7	26	5	12
24	2	79	0	82	11	10	9	18	7	20	5	5
25	2	73	0	75	11	4	9	12	7	13	4	98
26	2	66	0	69	10	98	9	6	7	6	4	91
27	2	59	0	63	10	92	8	99	6	99	4	85
28	2	53	0	57	10	86	8	93	6	92	4	78
29	2	47			10	80	8	86	6	85	4	71
30	2	39			10	74	8	80	6	78	4	64
31	2	33			10	68			6	71		

A Table of the Complement of the Suns right Ascension, for every day at midnight, in hours, and hundred parts.

Dais	July.		Augu.		Septe.		Octobe.		Nove.		Dece.	
	H.	pts.	H.	pts.	H.	pts.	H.	pts.	H.	pts.	H.	pts.
1	4	57	2	54	0	65	10	84	8	84	6	70
2	4	51	2	48	0	59	10	78	8	77	6	72
3	4	44	2	42	0	53	10	72	8	70	6	55
4	4	37	2	36	0	47	10	65	8	63	6	48
5	4	30	2	29	0	41	10	59	8	56	6	40
6	4	24	2	23	0	35	10	53	8	49	6	33
7	4	17	2	17	0	29	10	47	8	42	6	25
8	4	10	2	11	0	23	10	40	8	35	6	18
9	4	3	2	4	0	17	10	34	8	28	6	11
10	3	97	1	98	0	11	10	28	8	23	6	3
11	3	90	1	92	0	5	10	22	8	15	5	96
12	3	84	1	86	11	99	10	15	8	8	5	88
13	3	77	1	80	11	93	10	9	8	1	5	81
14	3	70	1	74	11	89	10	2	7	93	5	73
15	3	63	1	68	11	81	9	96	7	86	5	66
16	3	57	1	61	11	75	9	90	7	71	5	59
17	3	51	1	55	11	69	9	83	7	73	5	51
18	3	44	1	49	11	63	9	77	7	65	5	44
19	3	38	1	43	11	57	9	70	7	58	5	36
20	3	31	1	37	11	51	9	67	7	50	5	29
21	3	25	1	31	11	45	9	60	7	43	5	21
22	3	18	1	25	11	39	9	51	7	36	5	14
23	3	13	1	19	11	33	9	44	7	28	5	7
24	3	5	1	13	11	27	9	37	7	21	4	99
25	2	99	1	7	11	20	9	31	7	14	4	92
26	2	92	1	1	11	14	9	24	7	7	4	85
27	2	86	0	95	11	8	9	18	6	99	4	78
28	2	80	0	89	11	2	9	11	6	92	4	70
29	2	73	0	83	10	96	9	4	6	84	4	63
30	2	67	0	77	10	90	8	98	6	77	4	55
31	2	61	0	71			8	91			4	48

A description of the former Table of the Suns Right Ascension.

I think it not amiss, before I shew the use of the former Table of Right Ascension, for the finding of the time of any Star coming to the Meridian, to explain unto you what we call Right Ascension.

Know therefore, that in the Sphere there is Right Ascension, Oblique Ascension, and *Mean* Ascension, which have all several definitions: but the rest being impertinent, I will only speak of Right Ascension, which is thus defined: Right Ascension is that portion of Equinoctial which cometh to the Meridian of Mansstead with any Star, or any part of the Ecliptick, or more plainly, it is that number of degrees of the Equinoctial, comprised betwixt the Vernall Equinoctial point, or intersection of the said Equinoctial circle and the first min. of Aries, and that Star or part of the Ecliptique, which is upon the Meridian at the day or time desired. As for your better understanding, if the beginning of Aries, be upon the Meridian or any point or Star in the said beginning of Aries, then hath the said point or Star so scituated no right Ascension at all, by reason that the beginning of the Equinoctiall cometh to the Meridian therewith: But if the beginning of Cancer, or any Star in that scituation be upon the Meridian, then is therewith it, under the same Meridian 60 degrees of the Equinoctial, or 6 hours of time being that every 15 degrees of the Equinoctial, answers to one houre of time, shewing that the Star or point which is in the beginning of Aries shall come to the Meridian 6 hours sooner than that other, which is in the beginning of Cancer, & so others. I doubt not but that these few words will suffice to give ꝑ the better light to ꝑ which followes. First therefore, to find the Right Ascenson of the Sun at any time, look for the Month in the head of the Table, & for the day of the Month at the left side of that face where the Month desired is, & in the common angle answering to them both is the hour and minute of the Suns right ascenson.

The use of the former Tables of the fixed Stars, and of the Suns Right Ascension.

This Table of ꝑ fixed Stars is reduced from 77 Stars to 65, which yet will be no less unto the Sea-man. For those Stars, which

which are left out are either very small, (and so not fit for observation) or else they are such as are so far to the Southwards, they could not be observed by Tycho, or any of the European Mathematicians, whose Observations are Authentical, and by this means there is very great difference in their accounts: As for Example, the two chiefest Stars left out are the last of Eridanus and Canopus, belonging to the Constellation of Argo, which are indeed Stars of the first Magnitude, and therefore if it were possible to have their true places, they would be of good use. But seeing some account the last of Eridanus to be in 21 deg. 10 min. ♍, and Latitude South 23 deg. 30 min. and others account it in 9 deg. 45 min. ♐, and Latitude South 59 deg. 30 min. while the truth is better known we need not relye upon such an uncertainty, having so many other Stars fit for Observation. So likewise for Canopus some reckon it to be in 8 deg. ♋, and South Latitude 75 deg. others allow it 69 deg. of Latitude.

In stead of these two I have added to the Table a Star of the second Magnitude, in the Lip of the wing of Pegasus, a Star so fit for observation, that Mr. Gunter maketh choice of it for one of the five Stars to be set upon his Quadrant. And all these Stars have their allowance of right Ascention and Declination for an hundred years, by which you may rectifie them in time to come. I have set down their places for the year 1660, and this Table will need no rectification til the year 1670.

To finde the time of any Stars coming to ♈ Meridian the first day of every month, take the number of the Star in ♈ first column of the left hand Page, and seek the same number in the last column of the right hand Page, and in the same line under the names of the moneths, you shall see the hour and hundreth part that the Star comes to the Meridian.

Example. If I do desire to know at what time the Bulls eye comes to the Meridian the first of January, I look in the first column of the left hand page, and I find his number 13, then I look 13 in the last column of the right hand page, and right under January in ♈ same line I finde 8 hours, & 71 hundred parts, and because I find the letter A next over head, I see it is afternoon, that is, 8

of the clock at night and 71 hundred parts, which is neer three quarters of an hour, and so of all other.

Again here you may see by the Tables what number of these stars are in rule for observation at any time. Example.

I desire to know how many of these stars are in the rule for observation the first of January, I look in the Table, & I find the second star, that is, the Southermost in the Whales-tail, to come to ♈ Meridian at 4 a clock and 88 parts after noon, that is, neer 5 of ♈ clock in the evening about which time ♈ stars begin first to appear: & so I follow on under the month of January, until I come to 6 a clock 1 part in the morning, that is, the 38 Star, which is the third in the Great Bears tail, between which & the fourth star are 36 Stars ♈ in the rule for observation the first of January.

But that you may know the time of any Star coming to the Meridian, any day of the month; and that somewhat more exactly, and with more ease, than by the rule formerly prescribed in this book: I have in the Tables of the Stars, added the right Ascension of every Star, in hours and hundred parts; and also made alteration in the Table of the Suns right Ascensions, setting down ♈ complement of the Suns right Ascension in stead of the right Ascension, which is much more easie in the use of it. For this requires only Addition, the other Subtraction, and many times one may forget, and subtract the one instead of the other. This Table also is fitted to the time of midnight, which is most proper, because the Stars are onely visible in the night. And in the right Ascension both of the Sun and Stars, I have not exceeded 12 hours, the account by that means being more easie; and if you know not whether the time fall out in the evening or morning, the Tables of the Months will direct you.

Now the rule for the using is thus. Adde the right Ascension of the Star, and the Complement of the Suns right Ascension for any night (as you finde it in the Table) together, and the Sun is right of the Stars coming to ♈ South, but if the Sun exceeds 12 ♈, cast away 12 and take the remainer. For Example.

The right Ascension of the Bulls Eye, is 4 h. 48 pts.
The Complement of ♈ Suns right Ascension, Jan. 21 is 3 h. 0 pts.

These

These two added together, make ------ 7 h. 28 pts. which is the time of that Stars coming to the South the 21 day of Janu at night, and so you must do for any other Star, at any other day.

To rectifie the Right Ascension of any of those Stars, whose difference is given, to any time within 100 years.

I Desire to know ỳ right ascension of Orions right shoulder in ỳ year 1686. Substract 1660 out of 1686 ỳ difference is 26: then say, if 100 years give 1 deg. 37 parts for the difference of Right ascension, what shall 26 years give? you shall find 0 deg. 35 parts fere, which added to 84 deg. 27 parts the right ascension of ỳ said Star in the year 1660. ỳ sum is 84 deg. 62 parts, the right ascension of the same Star in the year 1686, and the like of all other.

To rectifie the Declination of any of these Stars that have the difference given, to any time within 100 years.

Example. I desire to know the declination of the Pole-star for the year 1667. I substract 1660 out of 1667, the difference is 7: then say if 100 years give 34 min. for the difference of Declination (as you may see in the Table) what shall 7 years give? and you shall find 2 min. 38 parts, which is to be added, as you may see by the letter A in the last column, to 87 deg. 30 min. the declination of the Pole-star for the year 1660. and the whole is 87 deg. 32 min. the Declination of the Pole-star for the year 1667. This way of rectifying ỳ righ Ascension and Declination, I doubt not but it shall meet with some captious censurers, but I know the defect between this & Calculation cannot be so palpable as their's in censuring: howbeit in the mean time, we may see that the former Tables for these Stars that I have calculated, must be renued again at most in 20 years, or else errors will be in their use.

HAving sufficiently explained unto you the manner and way, how both by the Sun and Stars to attain to the true height of ỳ Pole, or Latitude of any place, I purpose now (God willing) to speak somewhat of the Longitude, which as the former is most easie, and the finding thereof known almost to all Seamen, so is the other as uncertain, & hath not yet hitherto been found out or known exactly to any, albeit that many learned men, and of great experience, having laboured very earnestly for the same, & many good means have they invented, as helps and assistance unto

Mariners

Mariners in their long Navigation and Trabels, by which though with great labour, care and industry, they transport themselves to the utmost Regions of the world: with far more ease and facility they might do it, if they could as perfectly and readily find the Longitude at all times, as they may the Latitude, for then having sailed many dayes in unknown parts upon the large and spacious Seas, and indured all those in-durable troubles, miseries, and unspeakable calamities, which do for the most part attend upon long Voyages; yet after all this, if upon the first fair opportunity they could readily with the Latitude finde also the Longitude, their fore-passed troubles would be joyfully remedied, being that these two (like lobing Sisters) would apply such pleasing comfort to their cold stomacks, after their tedious trabels, by giving them the true prick or place of their then present being, Peter Apian, & Gemma Frisius hath written thereof, as also some others, but truly in my opinion, it was never brought to so exquisite perfection, as is now adays: and for me to write thereof were but as it were to set up a Candle at noon dayes, rather to shew mine own folly, then to light those that know a better way than my self, in which doing well may Apelles saying, Ne Sutor ultra crepidam, be applied unto me: but for my excuse, I do intreat the judicious to perswade themselves that it is far from my thought to set down any thing in this for a president unto them, but onely in good will to shew my opinion thereof to the ignorant, being as followeth.

First, therefore the Latitude being known, by finding the Longitude also, you have the true prick or place in the Globe, or Card where your ship is, which to find the nearest, is two wayes: one by dead Reckoning, the other by observation: but dead Reckoning (as they call it) being as I take it most used, I will speak first thereof, by which, if it were possible that this Reckoning could exactly and precisely be kept, it would give both Latitude and Longitude without any Observation at all: the different Latitude being onely the distance that the ship is departed from the Parallel where she last was, either Northward or Southward: and Longit. being the distance that she is departed from the Meridian either Eastward or Westward: For the knowledge whereof, these things are principally to be considered.

First

First, the true pitch or place of the Ships being at the beginning of the Voyage.

Secondly, a sound and experimented judgement of the way that the Ship maketh with every bit of winde.

Thirdly, to know exactly how much the Compass doth vary from the true North or South point, upon which the Needle is touch't either Eastward or Westward, in as many several places as conveniently may be observed.

Fourthly, to note diligently the Floods or Currents, which may cause the Ships way to be more Leaward, or otherwise than expectation, and to give allowance of her course and way accordingly.

Fifthly, the several points of the Compass that she makes her course good upon, and what way she hath made upon every point.

Sixthly, to bring these several Courses into one streight line, thereby to know what Course she hath made good with the nerest distance upon the said Point or Rumb, that she hath made her way good upon.

And lastly, knowing how many leagues doth raise or lay a degree upon the said Rumb, and true reckoning of your said Course and distance, gives you the difference of Latitude, or the Parallel where the Ship then is: and also knowing how many leagues answer to a deg. of E. and W. in the said Parallel, the Course, Distance, and Latitude gives the difference of Longitude, or the Meridian under which the Ship then is, the intersection of which said Parallel and Meridian is the Pitch or place of the Ships then being, of which things I will speak more particularly afterward.

Now it resteth to speak something of knowing the Longitude onely by observation which is very necessary to be known, that thereby the one may make trial of the other, being that if the accompt by dead reckoning, and also by Observation do both agree in the Latitude and Longitude, then you may be well assured, that you know truly the place where you then are, which Longitude by observation is thus known: prepare a very perfect and true running glass, which may precisely run 24 hours without error, and about the time that you purpose to set sail, let the said

glass

glass running just at 12 a clock when the Sun is upon the Meridian: being run out, be sure to turn the said glass instantly as it is out: not losing any time in the turning of it, & so having very warily kept the said glass till you think good to make an observation, at which time it is requisite to have in readiness an halfe hour glass and a minute glass, that if the 24 hour glass be out, before the Sun comes to the Meridian, then so soon as it is out, to turn the half hour glass or minute glass, as you see occasion, thereby to know presently, how much the 24 hour glass is out before the Sun comes to the Meridian: for if the Sun is upon the Meridian just when the 24 hour glass is out, then you may assure your selfe that you have sailed North and South, and are still under the same Meridian you were at the first, but if ỳ 24 hour glass be out before the Sun comes to the Meridian, for every four minutes that the glass is out before noon, your difference of Longitude is 1 deg. to the Westward, and for every hour 15 degrees.

And contrary, if the Sun comes to the Meridian before the glass is out, then according to the same proportion of time is your difference of Longitude to the Eastward, which difference of Longitude, if you multiply by the number of miles answerable to a degree of Longitude in that Latitude, where you then find your selfe to be, the Product gives ỳ miles of the distance, that you are either to the Eastward or Westward of the Meridian that you are departed from.

The like may also be effected by any of those fixed stars, whose true time of coming to the Meridian you know: for if the accompt of time precisely kept by your glass, and the stars coming to the Meridian, as you finde in your Table of right Ascension do justly agree, then are you still under one and the same Meridian, but if the time be past by your accompt, that the said Star should be upon the Meridian before the Star doth come to the Meridian, for every hour that the Star comes to the Meridian after the said time past, your difference of Longitude is 15 deg. to ỳ Westward and for every houre ỳ the Star comes to the Meridian before by your accompt of time truly kept, it should be upon the Meridian, your difference of Longitude is 15 deg. to the Eastward.

Although

Although the Author of this Book in his time, knew of no other means to attain the Longitude, then by such as he hath here published, and by the Eclipses which seldome happen, yet seeing it hath pleased God since his time to reveal a manifest way, (which cannot be stopped, but it will come to perfection) to attain the Longitude; I suppose it necessary to speak something of it, because it falls out so fit in this place.

There are ways which are not immaginary (as some affirm) but real and grounded upon as certain natural principles, as any Mathematical conclusions whatsoever in Geography or Navigation.

And whatsoever many may expect some excellent way for it from forreign parts, by certain small stars neer Jupiter, and that some here at home would have the world contested of a way by Celestial Observation, yet it is without doubt, y Longit. must be found by Observation made of something below the Moon: for I do truly affirm, that there are magneticall Poles, whose Latitude and Longitude I do as certainly know, as concurrent observations and Arithmetical Calculations can discover them, and their annual motion I know, and by consequence the time of their Revolution. It may be objected, that the variation in many, nay in most places are very irregular, and not according to such Magnetical Poles as I speak of, for in some places on the same Parallel in equal spaces, it altereth much swifter than in other, besides in the Parallel of London, there is two deg. 00 Easterly variation to the Eastwards of London, and 2 deg. 00 Easterly variation to the Westwards of London: yet both these places are to y Eastwards of the first Meridian of the world, within 45 deg. 0 min. of Longitude. It is true, but all this I can very well resolve, and I doubt not but to do it for all places: moreover there are some places within a certain Longit. whose variations continue constant for hundreds of years, & yet afterwards do vary as ours here at London doth now but at London it is never constant, although in former time the variation of it was not sensible, it is now in its swiftest motion. It were to be wished (that as many

noble minded men have been at charge oftentimes to adventure towards the seeking out of a passage Northwest into the South Sea, that some nobly minded would take this into consideration, or that some noble men furnished with convenient & exact Instruments might make Observation to the Westwards: for the more full perfecting of this work, it would make much for their lasting Fame, and for ye honour of this Kingdom; but because I am confined to a little room, I must abruptly end my discourse of Longitude, only take notice, that those that live untill the year of our Lord 1657, shall not see any variation at all at London, and afterwards it will increase Westwardly at least for 50 years.

This being written by Mr. Bend 20 years ago it came to pass exactly, so that in July 1657 it was observed there was no variation at London, and now the variation will begin to be Westerly, and will increase Westerly about 11 min. every year for the first 30 or 40 years, but afterward the motion will not be so fast. The period of the motion is about 370 years.

Of the Variation of the Compass.

Concerning the Variation of the Compass it hath been very learnedly treated on by divers of our Countrey men, & in our vulgar tongue, and namely by Mr. Norman and Mr. Burrowes in their Books called the New Attractive and Variation of the Compass; and since that most excellently & ingeniously written of, by that rare and learned Mathematician of our time Mr. Wright, in his Book of ye Correction of Errours in Navigation, as also in his Translation called ye Haven-finding Art: In which respect it is needless for me here to write any thing thereof, only let it suffice to speak a little thereof, & being necessary to the knowledge of the foregoing matter, for them that would willingly note how much the Compass doth vary in several places of their sailing, I think it best to have the Needles of their Compass touched upon a good Lone, & so place directly under the N. point of the Fly without allowing any Variation at all, the outer edge of the said Fly to be graduated to each quarter into 90 degrees, for ye ready reckoning of the degrees that the Compass doth vary from the true N. or S either towards the E. or W. Over which Fly, it is necessary to have

a round circle of brass with two sights upon the same the one directly against the other at opposite points to be raised perpendicularly where occasion shal serve, which circle with the sights thereon, as I have said being placed upon the glass over the Fly within the box, where the Compass is, when you would observe the variation of ye Compass, just either at the Sun rising or setting, turn the sights in ye brass Circle towards the Sun, & looking through the same mark precisely how many deg. the Sun riseth or setteth from the E. or W. point of the Fly or Compass: for if the Sun be in the Equinoctiall, having then no amplitude, so much as is ye difference of the Suns rising or setting from the E or W points, shewed by the Compass, is the variation of the Compass from the true N or S but if the Sun be either to ye Northward or Southward of the Equinoctial, having Amplitude, then is there a respect also to be had to the Suns Amplitude: as thus, if ye Sun hath N. or South Amplitude, and that you observe the Sun to rise or set so much from the East or West point of ye Compass as is the Suns Amplitude and likewise the same way that the Amplitude is, then hath the Compasse no variation: but if the Sun having N. Amplitude riseth notwithstanding more Northerly by your Compass, then by the said Amplitude it should do, ye deg. of true Amplitude deducted from the Amplitude which ye Compass sheweth, leaves the variation of the Compass to the Eastwards of the North; but if the true Amplitude be greater than the Compass sheweth, the one deducted from the other, leaveth the Variation to the Westward of the North: & if the Amplitude be Southerly, and the Compass shew the Sun to rise Northerly, both the differences added together, gives the variation Easterly: or if the Amplitude be Northerly, and the Compass shews it to be Southerly, then both ye differences added together, give the variation Westerly. All this is to be understood, when you observe by the Amplitude Ortive, viz. at the Suns rising: for if you observe the setting thereof then by adding or deducting the differences between the true Amplitude known, and the Amplitude given by the Compass, the total or remainer shews the Compass to vary so much to the contrary side; and Example will

make all this plain unto you, which let it be thus proposed. Suppose that being at Sea you find by the Table of Sines hereafter set down (or by some other means) the Sunns Amplitude at a time to be 20 degrees to the Northward and setting the Sun at his rising by the Compass (as is before shewed) you find that the Sun riseth 35 deg. to the Northward of the East, which is somewhat to the Northwards of the Northeast and by East point, therefore substracting 20 deg. the Suns true Amplitude from 35 deg. the Amplitude which the Compass sheweth, the remainer being 15 deg. sheweth the Compass to be so much varied from the North to the Eastward, which is one whole point and a tenth: otherwise the Sun having the same Amplitude Northerly (as is aforesaid) and setting him at his going down by the Compass, the said Compass sheweth him to set onely 5 degrees to the Northward of the West, which deducted from 20 deg. the true Amplitude leaveth 15 deg. for the variation of the Compass to the Eastward, as before.

See Prop. 3 of the use of the Signs.

As for Example.

Suppose that the Sun having 23 degrees of South Amplitude, and the Compass sheweth the Amplitude at rising to be 11 deg. Northerly, adde 23 deg. the true Amplitude, with 11 deg. of Contrary Amplitude, which the Compass sheweth, and the product 34 degrees, being three whole points and somewhat more sheweth that the Compass is so much varied from the true North to the Eastward.

Again, the Sun having the same Amplitude Southerly, you observe at his setting, and find by your Compass that he setteth 11 deg. Northerly, adding the two Amplitudes as aforesaid 23 and 11, the Product 34 sheweth the variation so much to the Westward, being that in the Observation at his rising E. and by N. points of the Compass standeth where the East Southeast should be: and at his setting in the other Observation, the West and by North points of the Compass pointed to the Sun, in which place should be the West Southwest points.

These few words will suffice being (that albeit to the ignorant they seem somewhat dark) yet in the practice thereof they shall find it, doubt not, but very plain and easie for their understandings

otherwise

therwise there are sundry sorts of Instruments to find the Variation by, but others having already written thereof. I have thought good also to put to my opinion of this plain & easie way, knowing that the Mariner, having made experience of many wayes, will onely use y which he findeth best, both for their ease, profit & truth thereof. And note y whatsoever is here spoken concerning the finding of the Variation by the Amplitude, the very like may be observed by the Azimuth, which by the Sun or Starrs being to be seen, may at any time be known.

How many leagues sailing upon any point of the Compass, will raise or lay a degree of Latitude, and what departure from the Meridian you make thereof.

This is so common in every Book, that I need not to write thereof, but only being y it is a necessary help to that which hath been before spoken of, it is not amisse to set it here down being as followeth.

First, sailing E. or W. you keep still one Meridian: and in sailing 20 *English leagues, you either raise or depress the Pole 1 deg. But if you sail upon the first point or Rumb from N. or S. either East or West-ward, you must sail 20 leagues & 1 third part to raise or lay 1 deg. of Latitude, and so having changed your Parallel a deg. y are also departed from your first Meridian 4 leagues, the way which your course was.

Upon the second point or Rumb from N. to E. 21 leagues & one third, raise or lay a deg. of Latitude and your distance from the Meridian is 8 leag. & one third.

Sailing upon the third point 24 leagues to raise or lay a degree and distance from the first Meridian is 13 leagues and one third.

*Here note that though the Author hath set down English leagues, yet it must be 20 such leagues as answers to 1 deg. of the Meridian, and therefore the Knots on the Logline must be 3 foot asunder at least according to the late experience made by Mr. Richard Norwood, which experiment was formerly verified by practice at Sea by Captain Thomas James in his Voyage to the Northwest, as we may see in the 7 page of his Journal, by the course, distance and Latitudes from the Blaskey (on the West of Ireland) to Cape Farewel, compared with Mr. Norwoods Experiment.

But because many can hardly be drawn to alter their Knots from their old Form, Therefore if any man will multiply 112 by the knots run out in halfe a minute; the Product, cutting off two Figures to the right hand, shall be the number of leagues run in a Watch, according to Mr. Norwoods Experiment.

Upon

Upon the fourth point 28 leagues and one third, raise or lay a degree of Latitude, and distance from the Meridian is 20 leag.

Upon the fifth point 30 leagues raise or lay a degree of Latitude, and distance from the Meridian is 30 leagues.

Sailing upon the fifth point or Rumb 52 leagues & one third, raise or lay a degree, and having altered your Latitude one degree upon that point, you are departed from the first Meridian 48 leagues and one third.

If you sail upon the seventh point, being the next from the East or West, ye may sail 102 leagues and 2 thirds, before you raise or lay the Pole one degree, and then are you 101 leagues from your first Meridian; but if you sail East or West, then are you still in a parallel, and neither raise nor lay the Pole at all.

To finde the distance between any two places, knowing the Longitude and Latitude of them.

IF the two places differ only in Latitude, then are they both under one and the same Meridian: and to know the distance betwixt them in miles or leagues, multiply the number of the deg. of difference by 60 miles or 20 leagues, the Product of which multiplication gives the true distance between them in miles or leagues according as you worke them, being that 60 miles or 20 leagues make 1 degree of a great Circle: but if the one place have N Latitude and the other S, then adde both their Latitudes together and worke as aforesaid: and if both the places are under the Equinoctial, they have then no Latitude. And there likewise 60 miles or 20 leagues makes 1 degree, and in working like the former, if the difference be under 180 degrees: But if the difference be more then 180, substract the said difference from 360, and multiply the remainer by 60 or 20, as before.

These are so plain and easie that they need no Example: but if they differ both in Longitude and Latitude, or in Longitude only in any parallel beside the Equinoctial, the working is somewhat more difficult, by reason that the further the Parallels are distant from the Equinoctial towards either of the Poles, the shorter they are, and the shorter the Parallels are, the fewer miles make

a deg. so that whereas in ꝯ Equinoctial 60 miles make one degree; yet in our Latitude, where the pole is raised about 52 deg. in this parallel 37 miles make a degree, and so every 37 miles East or West in this parallel are so many degrees. For which purpose I have here added a new Table shewing ꝯ miles of distance answerable to a deg. in every several latitude from ꝯ Equinoctial towards either of the Poles: and when you know the miles answerable to a degree in the Parallel desired, if the difference of the two places be only in longitude, multiply the difference of their longitude by the number of miles answerable to a degree: and the Product sheweth the distance in English or Italian miles betwixt the said two places.

Example.

London & Middleborough have both in a manner one latitude, viz. about 52 deg. & I find in this Table that in ꝯ Parallel of 52 deg. 36 miles 84 parts make a deg. of Longitude, the longit. of London is 2 deg. 50 min. which subtracted one from another leaves 3 deg. 50 min. for the difference of longit. Then multiplying 3 deg. by 37 miles, ꝯ Product is 111 miles: Then for 50 min. I say by ꝯ Rule of 3, If 60 min. gives 37 miles, what gives 50 min? Facit near 31, which added to 111, makes 142 miles, or 4 leag. and 2 mile, for the distance betwixt London and Middleborough.

But if ꝯ two places differ both in longitude & latitude then is ꝯ working more difficult then either of the former: For first you must take ꝯ difference of ꝯ two places in longitude, & then their difference also in latit. then multiply ꝯ difference of latitude of the two places by 60, & set the Product thereof by it self for the first number: then

Degrees of Latitude	Miles and 100 parts in a deg.		Degrees of Latitude	Miles and 100 parts in a deg.	
	M	pts.		M	pts.
1	59	99	46	41	68
2	59	96	47	40	92
3	59	92	48	40	15
4	59	85	49	39	36
5	59	77	50	38	57
6	59	67	51	37	76
7	59	55	52	36	94
8	59	41	53	36	11
9	59	26	54	35	27
10	59	9	55	34	41
11	58	90	56	33	55
12	58	69	57	32	68
13	58	46	58	31	80
14	58	22	59	30	90
15	57	96	60	29	99
16	57	67	61	29	9
17	57	38	62	28	17
18	57	6	63	27	24
19	56	73	64	26	30
20	56	38	65	25	36
21	56	1	66	24	40
22	55	63	67	23	44
23	55	23	68	22	47
24	54	81	69	21	50
25	53	38	70	20	52
26	53	93	71	19	53
27	53	46	72	18	54
28	52	98	73	17	54
29	52	48	74	16	54
30	51	96	75	15	53
31	51	42	76	14	51
32	50	87	77	13	50
33	50	32	78	12	47
34	49	74	79	11	45
35	49	13	80	10	42
36	48	54	81	09	38
37	47	92	82	08	35
38	47	28	83	07	31
39	46	63	84	06	27
40	45	96	85	05	23
41	45	28	86	04	18
42	44	59	87	03	14
43	43	88	88	02	09
44	43	16	89	01	05
45	42	43	90	00	00

mul-

multiply ℔ difference of Longit. by ℔ number of miles answerable to each Latit. severally, and adde both the Products together, the half whereof set down for your second number, and multiplying each of the said two numbers into it self squarely, adde both the Products together; and extracting the square root thereof, the said square root is the distance betwixt the two places desired.

But for the finding of the Distance of Places, here follows an easier way and more naturall by the Table of Sines, which will be necessary to make use of the Table of Longitude and Latitude, as also to make trial of the Difference that is between the true distance of Places as they are upon the Globe, and as most of them are laid down upon the plain Sea-Cards.

1 IF one place be under the Equinoctial, and the other have Latitude, and their difference of Longitude be 90 deg. 0 min. then their distance asunder is 90 deg. 0 min.

2 If one place be under the Equinoctial, and the other have Latitude, and their difference of longitude be more than 90 deg. 0 min. subtract 90 deg. from it, & seek the line of the remainer, and adde it to 10000, and multiply the Sum by the line of the Complement of the Latitude of the other place, cutting off 4 Figures to the right hand from the product, & from the rest subtract the line of the Complement of the Latitude given, and the remainer shall be the line of the Complement of the Distance between the two places, unto the arch of which line adde 90 deg. 0 min. and the whole is the distance required.

But if their difference of Longitude be less then 90 deg. 0 m: subtract it out of 90 deg. 0 min. and seek the line of the remainer, and multiply it by the line of the Complement of the Latitude given, cutting off 4 figures to the right hand from the Product, and the rest is the line of the Complement of the distance between the two places.

3 If both places have Latitude, adde one Latitude to ℔ Complement of the other, and seek the line of the sum, which line keep:

Then

Then if the difference of Longitude be more then 90 deg. 0 min. seek the sine of the excess above 90 deg. 0 min. and adde it to 10000, which sum keep, but if it be less than 90 deg. 0 min. seek the sine of the Complement of it, and substract it from 10000, and keep the remainer, next multiply the sum kept, or this remainer by the sine of the Complement of one Latitude, cutting off 4 figures to the right hand of the Product, and the rest multiply by the sine of the Complement of the other Latitude, cutting also off 4 figures to the right hand of the Product, and take the difference between this last Product and the sine of the sum of the Complement of one Latitude added to the other Latitude, which difference shall be the sine of the Complement of the distance between the two places.

Note, if the last Product be equal to the sine of the sum of the Complement of one Latitude added to the other Latitude, the two places are 90 deg. 0 min. distant asunder, but if it be less than the said sine, they are less then 90 deg. 0 min. asunder, but if it be more than the said sine, then the former difference is the sine of the excess above 90 deg. 0 min. unto which adde 90 deg. 0 min. and the whole is the distance required.

Example of the second.

The Iland of S. Thomas under the Equinoctial Longit. 38 deg. 0 min. and Java minor Long. 151 deg. 0 min. & Lat. 8 deg. 0 min. difference of the Long. 113 deg. 0 min. the excess above 90 deg. 0 min. is 23 deg. 0 min the sine 3908, which added to 10000, the sum is 13908, the Complement of the Latit. given 82 deg 0 min the sine is, 9903, which multiplied by 13908, the Product is, cutting off 4 figures to ẏ right hand 13773, from which substract 9906, the sine of the Complement of the Latitude, the remainer is 3870, the sine of 22 deg. 46 min. unto which added 90 deg. 0 min. and the whole is 112 deg. 46 min. which multiplied by 60, and 46 min. added is 6766 miles, the distance of the two places.

Example of the third.

Nova Zembla Longit. 83 deg. 29 min. and Latit 74 deg. 0 min. and new Plimouth in New England, Longit. 305 degrees, 0 min. and Latitude 41 deg. 37 min. lesser Latitude added to the Complement of the greater, the sum is 57 deg. 37 min. whole sine is 8145, the difference of Longit. 128 deg. 29 min. the excess above

90 d. 0 m. is 38 deg. 29 min. whose sine is 6223 which added to 10000, the sum is 106223, which multiplied by 7476, the sine of the Complement of 41 deg. 37 min. the Product is 12128. And this multiplyed again by 2756, the sine of the Complement of 74 deg 0 min. the last Product is 3342, which substracted from the sine of the sum of one Latitude, and added to the Complement of the other Latitude, viz. the sine of 57 deg. 37 min. that is 8445, and the remainer is 5103, the sine of 30 deg 41 min. whose Complement is 59 deg. 19 min. which being multiplyed by 60, makes 3559 miles, the distance required.

The ingenious Mariners may sail by knowing the true Longitude and Latitude of places, to any place assigned as well by a blanck of paper or past-board as by his Sea-card, by the help of a Protractor.

For Example.

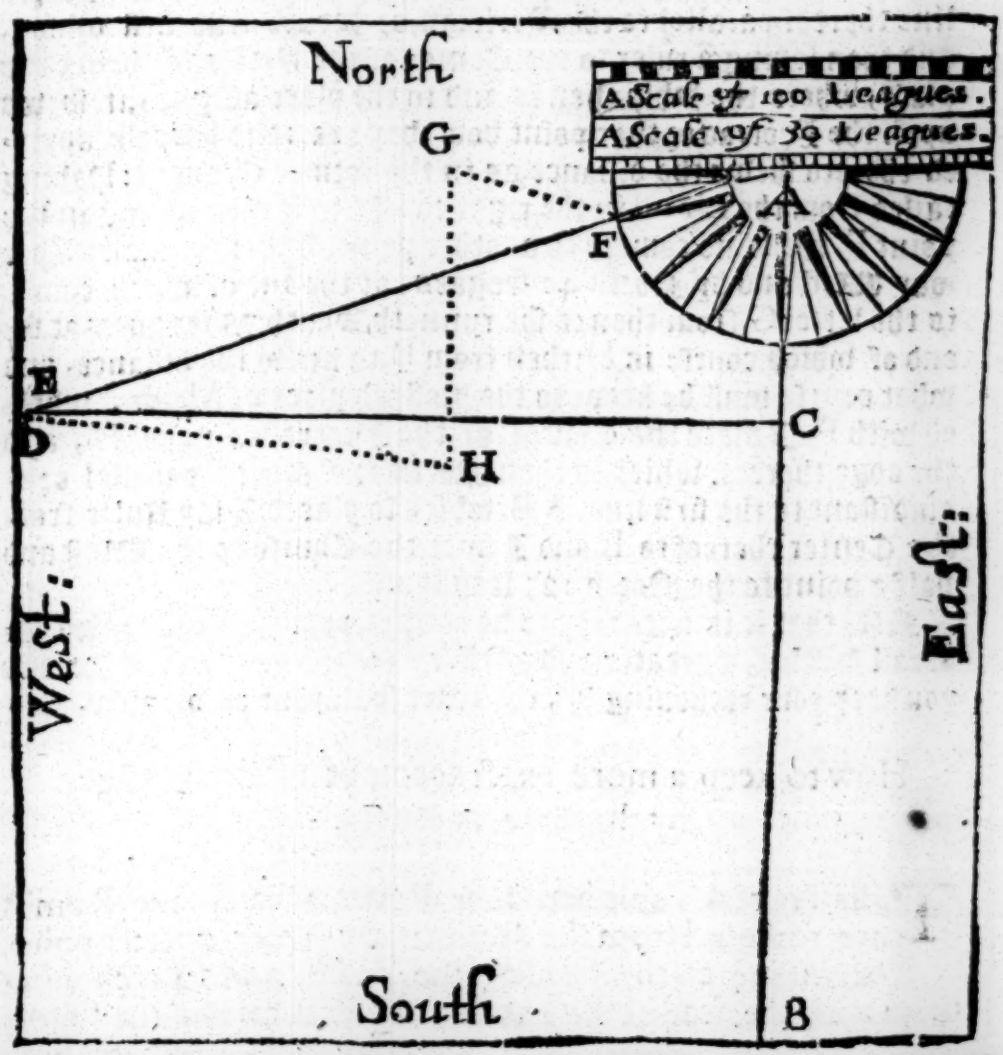
A Ship being at Lizard, in the Southwest parts of England, whose Longitude and Latitude I finde in the Table following to be 18 deg. 30 minutes, and 50 deg. 10 minutes, is bound for an Island in the Ocean Sea, called Maida, whose Longitude I find in the same Table to be 2 deg. 40 minutes, and latitude 40 deg. 40 minutes, the difference of their Latitude is 3 degrees 30 min which is 210 miles, or 70 leagues: Therefore from the prick or point A I draw the line A B in the Traverse-board here adjoyning and upon the point A I place the Center of the Protractor being one half of the Mariners Compass, the middle point whereof representing the North or South, (as occasion serves) I lay upon the line A B, and applying 70 leagues, (whereof the Scale on the edge of the Protractor contains 100) from A towards B, where the said 70 ends, I make a prick marked with C, so is A C 70 leagues, the distance between the Lizard and the parallel of Maida, then from C I draw the line C D at right angles to A B, and by the former Chapter I finde the distance betwixt Maida and the Meridian of the Lizard to be 629 miles or 209 leagues and two miles: which by the Scale aforesaid applyed to the line C D at the end of the distance I set a prick marked with E, so is the line C E 209 $\frac{1}{3}$ leagues, the distance that *Maida* is to the Westward of the Meridian of the Lizard, or the line A B, then the Protractor lying as at the first, I lay a Ruler from the Center thereof to the last prick E, and with the former Scale measuring

along

along by the edge of the Ruler from A the first prick, to E the last, I finde the distance to be 222 leagues, and the Ruler cuts the point West and by South, and halfe a point to the Southwards. So I conclude the Isle of *Maida* to be distant from the Lizard 222 leagues, and the direct course West and by South, and halfe a point Southwards.

But if the wind be scant or contrary, so that you cannot sail by

The Type of a Traverse-board and a Protractor.



the direct course; then must you keep a reckoning how many leagues you sail upon every other point; and where you change your course, there place the Center of the Protractor, keeping the Meridian, or North and South line of the Protractor parallel to the Meridian drawn on the Travers-board, and laying a ruler from the Center of the Protractor along that point upon which the Ship maketh her way, & to the edge of the ruler so placed apply so many leagues of the Scale, as the Ship hath sailed upon that point, and then where that number ends, set a prick for the place, where the Ship then is, and again upon that prick or place the Center of the Protractor lying as before, the South & North line thereof parallel to the Meridian, or South line first drawn, and then laying a ruler to the Center of the Protractor being the place, where the Ship then is, and to the place assigned, it shewes upon the Protractor that point how they bear: and ỳ Scale applyed thereto shews the distance, as in the former Example: Having sailed from the Lizard in the right course 50 leagues, being in the point F, the wind cometh to another point, so that she maketh her way West and by North 40 leagues, at the end of which course is the letter G, from thence she runneth South 75 leagues; at the end of which course is H: then from H, to know the distance, and what course must be keept to the prefixed place of Maida, marked with F, I place the Center of the Protractor upon H, and the edge thereof, which is then North and South parallel or equidistant to the first line, A B, which so placed I lay Ruler from the Center thereof to E, and I finde the Course to the West and half a point to the North 125 leagues.

Note that it is necessary to have upon your Protractor two severall Scales, a greater and a lesser, for the greater the scale is you keep your reckoning by, the truer shall your accompt be.

How to keep a more exact accompt of the voyage, by the Travers Table.

THis Travers Table hath four Parts, wherein the Rumbs are reckoned from the *Meridian*, by every quarter point, beginning at the head of the Table, and so reckoning them upon the head of the Tables, till it comes to the fourth Rumb

Rumb, and then the Rumbs are reckoned at the bottome of the Tables back again. The margent or side of the Table, shews the leagues sailed, and the middle part shews how much you have sailed, either East or West, from the meridian: or North or South from the Latitude, according to the letters E: W: N. S. at the top and bottom of the Tables, which Table are cast up according to the 12 and 13 proposition following.

For Example.

Suppose a Ship sailes 50 leagues or miles South Westerly upon the sixth Rumb and an halfe, I would know how much I am to the Westward, and how much to the Southward. For this look into the Table and in the second part thereof, at the botom of the Table, I finde 6 Rumbs ½ and against 50 in the side, I finde the Numbers, 47, 84, and 14, 50, as they stand here in the margent. Now because the rumb of the course stands at the bottom of the Table, I observe how the Letters stand & they shew, that by this course I am run 14 leagues or miles and 50 parts or an halfe in Latitude to the Southwards, and 47 leagues or miles and 84 parts, that is almost 48 leagues or miles to the Westward from the Meridian I sailed from. But now, if the Ships course had been one Rumb ½ from the Meridian, as it is at the top of this part of the Table, then you must have accounted according to the letters at the top of the Table, *viz.* Southerly 47 leagues 84 parts, and Westerly 14 leagues 50 parts

1 Rumb ½

N S | E W

47 84 | 14 50

E W | N S

6 Rumb ½

And thus any particular course being found, you may set it upon the plain chart by the Latitude and departure from the Meridian, by laying a ruler to the said Latitude and Longitude in any little draught, better than by a Protractor with a large Scale

But when you have occasion to run several courses, as you must in most voyages, your best way will be to keep a reckoning of them in such a like Table as this following.

The

The places	The course	Rumb frō the Merid	Distan. Run L. pts.	North L. pts	South L. pts.	East L. pts.	West L. pts.	Latit. D. M.	Long. d. p s.
A shews the Lizar								50 10	18 50
From A to F	S W	6 R½	50 . 0		14 50		47 84	49 27	14 80
From E to G	N W	7 R 0	40 0	07 80			39 23	49 51	11 78
From G to H	South	0 R 0	75 0		75 0			46 6	11 78
From H to E	N W	7 R ½	100 0 020 0 005 0	09 80 01 96 00 49			99 51 19 90 0 47	46 42	2 74
		Sum	290 0	200 5	89 50		211 45		

To explain this, take the last Example before mentioned in the Traverse-boord, wherein a Ship saying from the *Lyzard* to the Island *Maida*, makes her first course from* A to F W. and by S. half a point to the Southward, that is Southwesterly 6 Rumbs and an half. Now by the Traverse-table, I find for this course (as before shewed) that the Ship hath sayled to the Southward 14 leagues 50 parts, and to the Westward 47 leagues 84 parts, which I set down accordingly under the Colums South & West.

**See the Traverse boord which hath this Example upon it page 113.*

The second course the Ship makes is from F to G, which is West and by North 40 leagues, that is upon the 7 Rumb from the Meridian: And for this I find in the Table, the Northing to be 7 leagues 80 parts, and the Westing to be 39 leagues 23 parts, which I likewise set down under their respective Colums of North and West.

The third course in this voyage, is from G to H, being 75 leagues South, this without farther trouble, I set down under the Colum of South.

The fourth course is from H to E being West, only half a point to the North, which is 7 Rumbs and an half from the Meridian the distance sailed 125 leagues, the Northing and Westing whereof I take out of the Table at 3 times, because it cannot be found in one line, and so set it down under the Colums of North and West, as you see in this Table.

And

And here now casting up the account, I find first that the Ship hath sailed in all 290 leagues. Secondly, finding in the North Column 20 leag. 5 parts, and in the South Column 8 > l. 5 pts. substracting the less from the greater: I find I am to the Southward 69 l. 45 pts. which makes 3 deg. 28 min: which substracted from the Latitude of the Lizard 50 deg. 10 min. shews the Latitude I am in, to be 46 deg. 42 min.

Thirdly, casting up the West column, I find I am to the Westwards 211 l. 45 pts. that is 634 miles: and by the former *Table I find, that in the Latitude of 48 d. which is about the middle Latit. that 40 miles 15 pts. make one deg. of Longit. by which dividing the said 634 miles, I find about 15 d. 80 pts: that is 15 d. 48 m. which substracted from the Longit. of the Lizard, 18 d. 30, there remains 2 deg 42 min: So that I am very neer the Island *Maida*, whose Long. is 2 d. 40 m. and Latit. 46 d. 40 m.

*Page 116 shewing how many miles make a deg. in any Latit.

But yet the Longitude may be more certainly known, if you cast it up at every course, which you may thus do exactly. If you keep your account in leagues, then 20 leagues making one degree, divide your leagu. by 20, or take the halt of your number of leagues, making the figures one place less, it shews the deg. and 100 pts. Thus in the first course, the Westerly distance from the Meridian, being 47 l. 84 pts. yeilds 2 d. 39 pts. which should be the difference of Longit. according to the plain chart.

But because the deg. of Longitude grow less as the Latitude encreaseth, you must proportion this by the middle Latit. thus. As the sine Complement of the middle Latit. of the course, is to the Radius. So the deg. and pts. of Longit. of the plain Chart, to the deg. and parts of Longitude of the true Chart or Globe.

Thus for the course aforesaid, the mid. latit. being 49 d. 48 m. & the difference from the Merid. 2 d. 39 pts. of the plain chart.

As sine compl. 49 d. 48 m. to 90 d. So 2 d. 39 pts. to 3 d. 70 pts.

6454 10000 2,39 3,70

And thus you may find the true Longit. of any course as exactly, and with as little trouble as any other way, and so find out your Longitude and Latiiude all along your voyage.

If you desire to be more fully instructed herein, you may see this applyed to all kinds of Sailings. In my Book called the *Advancement of the Art of Navigation*. The

The Traverse Table.

0 R. 1/4

2 d. 49 m.

Leagues sailed	N	S	E	W
1	01	00	00	05
2	02	00	00	10
3	03	00	00	15
4	04	00	00	20
5	04	09	00	25
6	05	09	00	29
7	06	09	00	34
8	07	09	00	39
9	08	09	00	44
10	09	09	00	49
20	19	97	00	98
30	29	96	01	47
40	39	95	01	96
50	49	94	02	45
60	59	92	02	94
70	69	91	03	43
80	79	90	03	92
90	89	89	04	41
100	99	87	04	90
200	199	76	09	80

E	W	N	S
27 d.	11 m.		

7 R. 1/4

0 R. 1/2

5 d. 38 m.

N	S	E	W
00	99	00	10
01	99	00	20
02	98	00	29
03	98	00	39
04	97	00	49
05	97	00	59
06	97	00	69
07	96	00	78
08	96	00	88
09	95	00	98
19	90	01	96
29	85	02	94
39	80	03	92
49	75	04	90
59	71	05	88
69	66	06	86
79	61	07	84
89	56	08	82
99	51	09	80
199.	02	19	60

E	W	N	S
24 d.	22 m.		

7 R. 1/2

0 R. 3/4

8 d. 26 m.

N	S	E	W
00	99	00	15
01	98	00	29
02	97	00	44
03	96	00	59
04	95	00	73
05	94	00	88
06	92	01	03
07	91	01	17
08	90	01	32
09	89	01	47
19	78	02	93
29	67	04	40
39	56	05	86
49	45	07	33
59	35	08	80
69	24	10	27
79	13	11	73
89	01	13	20
98	91	14	67
197	82	29	34

E	W	N	S
21 d.	34 m.		

7 R. 3/4

1 Rumb.

11 d. 15 m.

Leagues sailed	N	S	E	W
1	00	98	00	20
2	01	96	00	39
3	02	94	00	58
4	03	92	00	78
5	04	90	00	98
6	05	88	01	17
7	06	86	01	37
8	07	85	01	56
9	08	83	01	76
10	09	81	01	95
20	19	61	03	90
30	29	42	05	85
40	39	23	07	80
50	49	03	09	75
60	58	84	11	70
70	68	65	13	65
80	78	46	15	60
90	88	27	17	55
100	98	08	19	50
200	196.	16	39	00

E	W	N	S
78 d.	45 m.		

7 Rumb.

1 R. 1/4

14 d. 4 m.

Leagues sailed	N	S	E	W
1	00	97	00	24
2	01	94	00	48
3	02	91	00	73
4	03	88	00	97
5	04	85	01	21
6	05	82	01	46
7	06	79	01	70
8	07	76	01	94
9	08	73	02	19
10	09	70	02	43
20	19	40	04	85
30	29	10	07	28
40	38	80	09	71
50	48	50	12	14
60	58	20	14	57
70	67	90	17	00
80	77	60	19	43
90	87	30	21	86
100	97	00	24	29
200	194	00	48	58

E	W	N	S
75 d.	56 m.		

6 R. 3/4

1 R. 1/2

16 d. 52 m.

N	S	E	W
00	96	00	29
01	91	00	58
02	87	00	87
03	83	01	16
04	78	01	45
05	74	01	74
06	70	02	03
07	65	02	32
08	61	02	61
09	56	02	90
19	13	05	80
28	70	08	70
38	27	11	61
47	84	14	50
57	41	17	41
66	98	20	31
76	55	23	22
86	12	26	12
95	69	29	02
191	38	58	04

E	W	N	S
33 d.	7 m.		

6 R. 1/2

1 R. 3/4

19 d. 41 m.

N	S	E	W
00	94	00	33
01	88	00	67
02	82	01	01
03	77	01	35
04	71	01	68
05	65	02	02
06	59	02	36
07	53	02	69
08	47	03	03
09	41	03	37
18	83	06	73
28	24	10	10
37	66	13	47
47	07	16	84
56	49	20	21
165	90	23	58
75	32	26	95
84	73	30	32
94	15	33	68
188	30	67	36

E	W	N	S
70 d.	19 m.		

6 R. 1/4

2 Rumb.

22 d. 30 m.

Leagues sailed	N	S	E	W
1	00	92	00	38
2	01	85	00	76
3	02	77	01	15
4	03	70	01	53
5	04	62	01	91
6	05	54	02	30
7	06	47	02	68
8	07	39	03	06
9	08	31	03	44
10	09	24	03	83
20	18	47	07	65
30	27	71	11	48
40	36	95	15	30
50	46	19	19	13
60	55	43	22	96
70	64	67	26	78
80	73	91	30	61
90	83	14	34	44
100	92	38	38	26
200	184	76	76	52

E	W	N	S
67 d.	30 m.		

6 Rumb

The Traverse Table.

2 R. 1/4

25 d. 19 m.

Leagues	N	S	E	W
1	00	90	00	43
2	01	81	00	85
3	02	71	01	28
4	03	61	01	71
5	04	52	02	14
6	05	42	02	56
7	06	33	02	99
8	07	23	03	42
9	08	14	03	85
10	09	04	04	28
20	18	07	08	55
30	27	11	12	82
40	36	15	17	10
50	45	19	21	37
60	54	23	25	62
70	63	27	29	92
80	72	31	34	20
90	81	35	38	47
100	90	39	42	75
200	180	78	85	50

E W | N S

64 d. 41 m.

5 R. 3/4

2 R. 1/2

23 d. 7 m.

N	S	E	W
00	88	00	47
01	76	00	94
02	64	01	41
03	53	01	88
04	41	02	36
05	29	02	83
06	17	03	30
07	05	03	77
07	94	04	24
08	82	04	71
17	63	09	42
26	45	14	14
35	27	18	85
44	09	23	56
52	91	28	28
61	73	32	99
70	55	37	71
79	37	42	43
88	19	47	13
176.	38	94	26

E W | N S

61 d. 52 m.

5 R. 1/2

2 R. 3/4

30 d. 56 m.

N	S	E	W
00	86	00	51
01	71	01	03
02	57	01	54
03	43	02	06
04	29	02	57
05	15	03	08
06	00	03	60
06	86	04	11
07	72	04	63
08	58	05	14
17	15	10	28
25	73	15	42
34	30	20	56
42	88	25	70
51	46	30	84
60	04	35	98
68	61	41	12
77	19	46	26
85	77	51	41
171	54	102.	82

E W | N S

59 d. 4 m.

5 R. 1/4

2 Rumb.

13 d. 45 m.

Leagues	N	S	E	W	Leagues & miles.
00	83	00	55	1	
01	66	01	11	2	
02	49	01	67	3	
03	32	02	22	4	
04	16	02	78	5	
04	99	03	33	6	
05	82	03	89	7	
06	65	04	44	8	
07	48	05	00	9	
08	31	05	55	10	
16	62	11	11	20	
24	94	16	66	30	
33	29	22	22	40	
41	57	27	77	50	
49	88	33	33	60	
58	20	38	88	70	
66	51	44	44	80	
74	83	50	00	90	
83	14	55	55	100	
166.	28	111.	11	200	

E W | N S

56 d. 15 m.

5 Rumb.

3 R. 1/4

36 d. 34 m.

Leagues	N	S	E	W	Leagues & miles.
1	00	8	00	60	
2	01	61	01	19	
3	02	41	01	79	
4	03	21	02	38	
5	04	02	02	98	
6	04	82	03	57	
7	05	62	04	17	
8	06	43	04	76	
9	07	23	05	36	
10	08	03	05	96	
10	16	06	11	91	
30	24	09	17	87	
40	32	12	23	82	
50	40	16	29	78	
60	48	19	35	74	
70	56	22	41	69	
80	64	25	47	65	
90	72	28	53	61	
100	80	32	59	56	
200	160	64	119	12	

E W | N S

53 d. 26 m.

4 R. 3/4

3 R. 1/2

32 d. 22 m.

N	S	E	W
00	77	00	63
01	55	01	27
02	32	01	90
03	09	02	54
03	86	03	17
04	64	03	81
05	41	04	44
06	18	05	07
06	96	05	71
07	73	06	34
15	46	12	68
23	19	19	03
30	92	25	37
38	65	31	71
46	38	38	06
54	11	44	41
61	84	50	75
69	57	57	09
77	30	63	43
154	60	126	86

E W | N S

50 d. 37 m.

4 R. 1/2

3 R. 3/4

42 d. 11 m.

N	S	E	W
00	74	00	67
01	48	01	34
02	22	02	01
02	96	02	69
03	70	03	36
04	44	04	03
05	18	04	70
05	93	05	37
06	67	06	04
07	41	06	72
14	81	13	43
22	22	20	14
29	63	26	86
37	04	33	57
44	45	40	29
51	85	47	00
59	26	53	72
66	67	60	44
74	08	67	15
148	16	134	32

E W | N S

47 d. 49 m.

4 R. 3/4

4 Rumb.

45 d. 0 m.

N	S	E	W	Leagues & miles.
00	71	00	71	1
01	41	01	41	2
02	12	02	12	3
02	83	02	83	4
03	54	03	54	5
04	24	04	24	6
04	95	04	95	7
05	66	05	66	8
06	36	06	36	9
07	07	07	07	10
14	14	14	14	20
21	21	21	21	30
28	28	28	28	40
35	35	35	35	50
42	42	42	42	60
49	49	49	49	70
56	56	56	56	80
63	63	63	63	90
70	71	70	71	100
141	41	141	41	200

E W | N S

45 d. 0 m.

4 Rumb.

Here followeth a brief Table of *Sines* for Arithmetical calculation, the total Sine whereof is 10000, with certain necessary Propositions to be wrought thereby, by which few things proposed, and Examples thereto annexed, any one that hath either an ingenious, Spirit or a willing minde to the practice of the Mathematical Sciences, may attain to much knowledge therein.

A brief Declaration of the same.

WHat the Table of Sines is, hath been very learnedly explained by others, and therefore needless it is for me to discourse thereof; onely take these few Instructions for the help of those, which as yet have no knowledge thereof. First, know that Sailing, which is the principal thing here aimed at, is performed by a true and perfect knowledge of the Sphere, by the projection whereof, all Calculation, Tables calculated, and Instruments for Observations are invented, protracted, framed and made.

What the Sphere is, I need not to discusse, the chief or great Circles thereof consisting of 360 degrees, and one quarter thereof being 90 deg. which quarter being taken from the whole Circumference, consisteth of these three particulars, viz. An Arch or part of a Circle being indeed 90 deg. or a quarter of the whole Circle, a right Angle, and two equal sides thereto, of which the one is the base or ground Line, the other a perpendicular let fall thereon at right Angles, the utmost ends or extentions of which two lines are the limits of the aforesaid Arch or quarter of a Circle: the which three parts so fitted together in their due order sheweth the perfect platform of one quarter of the whole Circle, commonly called a Quadrant: the base or ground line whereof being divided into 10000 equal parts, is Sinus totus, or the whole Sine: and the whole Arch or quarter of a Circle into 90 deg. is the whole Arch belonging to the said whole Sine.

Within which Quadrant any number of deg. or min. counted from the beginning or first perpendicular, may be called an Arch or part of a Circle, & another perpendicular let fall there from to the

the aforesaid base or ground line, the number of equal parts that the said perpendicular falleth upon, is the right sine to the arch given: and the Complement of the arch given is the remainer thereof, it being taken from 90 deg. or the whole Quadrant. To find out the right sine of any given arch, look in the head of the Table following for the deg. thereof, and if there be any min. therewith, look for the min. at the left side of the Table, & carrying your eye downward from the degrees, till you come right against them in the number which you find in the common angle to them both, is the right sine of your given arch desired: as if you desire the sine of 35 deg. 20 min. look in the head of the Table for 35, & upon the left side thereof for 20, & in the common square or angle right against them both, you shall find 5783. which is the sine of 35 deg. 20 min. and if you substract 35 deg. 20 m. from 90 d. the remainer 54 d. 40 m. is the Complement thereof, whose right sine (found as before is taught) is 8158: what the versed sine is, & how found out, is afterward shewed, I doubt not but that these few words will suffice for the explaining of the Table following, whose large and ample uses for Navigation, and other the Mathematical practices, these following exemplary Propositions will in some reasonable sort make manifest: by which few here proposed and answered, the ingenious may gather the manifold uses thereof, being that indeed the benefit to be reaped thereby is great, and the Propositions to be wrought thereby infinite. Whose desires more perfection in this kind of Navigation, and generally in all Mathematical practices, let them spend some time in the study of Pitiscus of the Doctrine of Triangles, not long since translated and and published in our English tongue by Mr. Ralph Handson.

Certain Propositions to be wrought by the Table of Sines.

The Suns true Place being known, to finde his Declination. Prop. 1.

As the whole sine, is to the sine of the greatest Declination, so is the sine of the Suns distance from the neerest Equinoctial point to the sine of the Declination for the day proposed.

Example.

Suppose the true place of the Sun to be in 20 deg. 36 min. of

Taurus, which is 50 d. 36 min from the beginning of Aries, or the Vernal Equinoctial point: therefore I must multiply the sine of 50 deg. 36 min. the Suns distance from the Equinoctial point, by the sine of 23 deg: 32 min. the greatest Declination, and that product must be divided by the whole Sine, whose several Signe being found out in the Table following, and set in order, the work will stand thus:

If 90	give	23. 32	what	50. 36
10000		3993		7727 3085

Facit 3085, whose neerest Arch 17 deg. 58 min. is the true Declination of the Sun, the day and year aforesaid.

The Declination of the Sun given, to find his place in the Zodiack. Prop. 3.

As the sine of the greatest declination is to the whole sine, so is the sine of the Declination for the day proposed, to the Suns place or distance from the neerest Equinoctiall point.

Example.

Suppose I finde that the Declination of the Sun is 17 deg. 58 min. North, therefore I say:

If 23. 32	give	90	what	17. 58
3993		10000		3083 7727

Facit neerest 7727, whose Arch 50 deg. 36 min is the Suns distance from the Vernall Equinoctial point of Aries, from which taking 30 deg. the whole sine of Aries, the remainer 20 deg. 36 min. shews the Sun to be so much entred into Taurus. which is the next Signe.

The Latitude of any place and the Declination of the Sun given, to finde the Amplitude Prop. 4.

As the Sine of the Complement of the Latitude, is in proportion to the whole sine, so is the sine of the Suns declination, to the Amplitude.

Example.

The Suns declination being 11 deg. 48 min: North I desire the Amplitude of the Sun, viz. How much the Sun doth rise and set from the true East and West point of the Horizon, towards the

the Nozth oz South in the Latitude of 51 deg. 40 min. to know which, the wozk is thus

If 38 deg. 20 min. the Complement of the Latitude give 90 degrees, the arch of the whole ſine, what gives 11 deg 48 min the declination of the Sun

38 deg. 20 min.	90	11 deg. 48 minutes
6202	10000	2045 3297

Facit 3297, neereſt, whole arch ſought out in the Table of Sines is 19 deg 15 min. foz the Amplitude of the Suns declination pzopoſed: the ſame dibided by 11 and one quarter, the number of degrees that belongs to a point of the Compaſs, ſheweth one point and 8 deg. which the Sun riſeth and ſets to the Nozthward of the Eaſt and Weſt, being that the declination is Nozth, foz if the declination were South, then were the Amplitude Southerly

The Declination and Amplitude of the Sun given, to finde the height of the Pole.

Probl. 5.

AS the ſine of ½ Amplitude is in pzopoztion to the ſine of the Declination, ſo is the whole Sine, to the ſine of the Complement of the Latitude.

Example:

The Declination 11 deg. 43 min. and the Amplitude 19 deg. 7 min. I demand the height of the Pole? Say,

If 19.7 give 11. 43 what 90?

3275 2031 10000 6102

Facit 6102, neereſt whole Arch in the Table of Sines being 38 degrees, 40 minutes is the height of ½ Equinoctial oz the Complement of the Latitude: That ſubſtracted from 90 degr. leaves 51 deg. 40 min. foz the height of the Pole, oz Latitude of the place deſired.

The true place and Declination of the Sun given, to find the Righe Aſcention. Probl. 5.

AS the ſine of the Complement of the Declination is to the total ſine, ſo is the ſine of the Complement of the Suns diſtance from the beginning of Aries, to the Complement of the right aſcenſion.

Example

Example:

I desire the right ascension of the Sun being in ten degrees, 14 min. of Taurus, in which place his Declination is 14 deg. 56 min. and the Complement thereof 75 deg. 4 min. and the distance from the beginning of Aries 40 deg. 14 min. whose complement is 49 deg. 46 minutes; I say then,

If 75. 54 give 90 what 49. 46 minutes?

9663 10000 7934 7900

Facit 7900: whose arch in the Table of Sines is 52 degrees, 11 min. the complement whereof 37 deg. 49 min. is the Suns right ascension, the same converted into hours by allowing 15 deg. to an hour, gives 2 hours. 31 minutes, 16 seconds.

This is to be understood, when the Sun is betwixt the beginning of Aries, and the Tropick of Cancer; for if the Sun be in the Tropick of Cancer, then is the right ascension 90 deg. or 6 hours: and if the Sun be betwixt the Tropick of Cancer; and the Equinoctial point of Libra, substract the distance that the Sun is from the beginning of Aries, out of a 180 degrees, and with the remainer work as before for the right ascension, which ascension so found, take from 180, and the remainer is the right ascension desired, But if the Sun be betwixt the Equinoctial of Libra, & the Tropick of Capricorn, substract the said distance from the beginning of Aries out of 180 degrees, and if betwixt the Tropick of Capricorn, and the beginning of Aries, take the said distance out of 360 degrees, and then work as before. One Example or two will make all this plain unto you.

The true place of the Sun being 17 deg. 51 min. of Cancer, is 107 deg. 51 min. from the beginning of Aries, which taken from 180, leaves 72 deg. 9 min. whose complement is 17 deg. 51 min. the Suns Declination being then 22 deg. 20 min. the complement thereof is 67 deg. 40 min. say then.

If 67. 40 give 90 what 17. 51 minutes?

9250 10000 3065 3314

Facit 3314, whose arch is 10 deg. 21 min. the complement whereof 70 deg. 39 min. taken from 180, leaves 109 deg. 21 min. for the right

right aſcention deſired, which converted into hours, makes 7 hou: 17 min. 24 ſeconds. Again, I deſire the right aſcenſion of 20 deg. 40 min. of Capricorn, whoſe diſtance is continual proceeding from the beginning of Aries, being 290 degrees 40 minutes, taken from 360, leaves 69 degrees 20 minutes with the Complement, whereof 20 degrees 40 minutes, and the Complement of the declination of the Sun upon the ſame point of the Suns place 68 degrees 6 minutes, I worke as followeth:

If 68. 6 give 90 what 20. 40?

9278 10000 3529 3803

Facit, 3803, whoſe Arch is 22 degrees, 21 minutes, the Complement whereof 67 deg. 39 min. taken from 360, leaves 292 deg. 21 min. for the right aſcenſion deſired, the ſame converted in to hours, is 19 hours, 29 minutes, 24 ſeconds.

The Latitude and Declination of the Sun known, to finde the difference aſcenſional.

Prop. 6.

As the ſine of the Complement of the latitude, is to the ſine of the Latitude, ſo is the ſine of the Declination to the Quotient found: again, as the ſine of the Complement of the Declination, is to the whole ſine; ſo if the ſaid Quotient found, to the difference aſſenſional.

Example.

I would know the difference aſcenſional, when the Declination is 20 degrees, 6 minutes, and the latitude 51 deg. 40 min. I ſay

If 38. 28 give 51. 40 what 20. 6?

6202 7844 3437 4346

Facit 4346, for the Quotient found. Then againe. I ſay,

If 62. 54 give 90 what 4346

9391 10000 4346 4627

Facit 4627, whoſe Arch in the Table of ſines 27 deg. 34 min. is the difference aſcenſional for the day propoſed: the ſame reduced into hours and minutes, makes one hour and 50 min. which taken from ſix a clock, the hour that the Sun riſeth, being in the Equinoctial, leaveth four hours, ten min. at what time the Sun, then riſeth, and the ſaid aſcenſional difference added to ſix a clock, makes

makes seven a clock: fifty minutes for the Suns setting.

Again, the said ascensional difference doubled, and added to 12 hours, the time from 6 in the morning till 6 at night, makes 15 houres, 40 minutes for the whole length of the day.

This is when the Sun hath North declination, for if the Declination be South, then the ascensional differenee added to six a clock gives the Suns rising: and taken from 6, leabs the setting, and being doubled, and taken from 12 hours, leabes the length of the day, as aforesaid.

Th: Amplitude and difference ascensional of the Sun or Star given to finde the Declination.

Prop. 7.

As the sine of the time of the Suns rising, converted into degrees and minutes, is to the sine of the complement of the Amplitude, so is the whole sine to the sine of ℘ complement of the Declination.

Example.

The difference ascentional being 27 deg 34 min. shews the Sun to rise at 4 a clock 10 min. which converted into degrees makes 62 deg. 30 min. and the Amplitude being found as before is shewed in the third proposition, is 32 deg 38 min and the complement thereof 56 deg 24 min Say then,

If 62. 30 give 56.22 what 90?

8870 8326 10000 6386

Facit 6386, whose Arch 69 deg 50 min the complement thereof 20 degrees 10 minutes is the Declination desired.

The Latitude and Declination given, to finde the Meridional altitude:

Prop. 8.

If the Sun habe north declination adde the complement of the Latitude to the Declination, the product is the Meridional Altitude.

Example.

If the Declination be 23 deg. 30 min. North, and the Latitude 51 degrees. 48 minutes, the complement thereof 38 degrees 20 min. added to 23 deg. 30 min. makes 61 degrees, 50 minutes, for

for the Meridian Altitude: but if the Declination be 23 deg. 30 min South, and the Latitude 51 degrees 40 min. substract 23 deg 30 min. the Declination from 38 deg. 20 minutes, the complement of the Latitude, and the remainer 14 deg. 50 min. is the altitude desired: and if the Sun be in ♈ Equinoctiall having no Declination, then is the Meridian Altitude equal to ♈ Complement of the Latitude.

The Latitude and Declination known, to finde the height of the Sun at any houre of the day.

Prop. 9.

FIrst you are to consider whether the Sun be in ♈ Equinoctial, or whether he hath North or South Declination, for if ♈ Sun be in the Equinoctial, then, as the whole sine, is to the sine of the complement of the Latitude, so is the sine of the complement of the Suns distance from noon (allowing 15 deg. for every hour) to the sine of the altitude desired.

Example:

At any year or day the Sun then having no Declination ♈ Latitude 51 deg 40 min. I desire ♈ Suns height at 9 a clock before noon, or at 3 afternoon. The Complement of ♈ Latitude is 38 d. 20 min. and the hours distance from noon 45 deg. whose Complement is also 45 deg. Say then,

If 90 give 38 20 what 45?

10000 6203 7071 4385

Facit 4385, whose Arch 26 deg. is the height of the Sun above the Horizon, at the time and place proposed.

If the Sun have Declination, then is the working somewhat more, except onely at 6 a clock either before or after noon: for which hour; as the whole sine, is to the sine of the Latitude: so is the sine of the Declination, to the sine of the Altitude.

Example.

The Latitude being 51 degrees 40 min. and the Declination 11 deg. 48 min. Say,

If 90 give 51:40 what 11.48?

10000 7844 2045 1604

Facit 1604, whole Arch 9 deg. 14 min. is the Altitude desired.

But for any other hour of the day, work as followeth, if it be in the forenoon, substract ye houre given out of 12 hours, & reduce the remainer into deg. and if the remainer be less then 6 hours, seek the sine complement of it, & substract it out of 10000 & keep the remainer; but if the former remainer be more then 6 hours substract 6 hours from it, and keep the sine of the remainer, and adde it to 1000; and keep the sum: then multiply the first remainer kept, or this last sum kept, by the sine of the complement of the Declination, cutting off 4 figures to ye right hand from the Product, and multiply the Product by the sine of the complement of the Latitude, cutting off also 4 figures to the right hand from the Product, & this last Product substract from the sine of the Meridian Altitude of the Sun, and the remainer is the sine of the Suns Altitude required.

You are to note, if the houre given be afternoon, you must take the houre given it selfe, & observe as before, whether it be more or lesse then 6 hours.

Example.

Any Day or Year, at 9 of the clock, Latitude 51 deg. 30 min, Declination 11 deg. 43 min. North, substract 9 from 12, ye remainer is 3, that being reduced, is 45 deg. 0 min. whose sine complement is 7071, which substracted from 10000, ye remainer is 2929 which multiplied by 9791, the sine complement of ye Declination 78 deg. 17 min. the Product is 2867, and this Product multiplied by 6225 the sine complement of the Latitude, the Last Product is 1784, Now the Meridian Altitude is 50 deg. 13 min. whose sine is 7685, from which substract the former number, the remainer is 5901, the sine of 36 degrees 9 minutes, the Suns Altitude required.

To finde the Suns Azimuth, having the Declination and Altitude of the Sun, and the height of the Pole given.

Prop. 10.

ADde the Complement of the Latitude to the Suns Altitude, and from the sine of that summe, substract the sine of the

the Suns Declination, and keep the remainer, when ẏ Sun hath North Declination, but if ẏ Sun have South Declination, adde the sine of the Declination, to the sine of that summe, and keep the whole summe, which remainer or summe, multiple by the 10000 for the dividend, and multiple the sine of the Complement of the Suns altitude by the sine of the Complement of the Latitude for the Divisor, cutting off 4 figures to the right hand from the Product, by which Divisor divide the former dividend, and if the Quotient be lesse then 10000 substract it from 10000, and ẏ remainer is the sine of the Azimuth from ẏ East or West Northwards: but if ẏ Quotient be more then 10000, substract 10000 from it, & the remainer is the sine of the Azimuth from the East or West Southwards.

Note, if the Sun have no Declination, then ẏ sine of the sum of the Suns Altitude, and the Complement of the Latitude must be multiplyed by 10000 for the Dividend, and the divisor must be as before.

Example.

The Sun having 13 degrees 0 min. North declination in Latitude 51 deg. 30 min. being 43 deg. 0 min. high in the fore-noon, I demand the Azimuth. The summe of the Suns altitude, & the complement of the Latitude 81 deg. 30 min. the sine 9890. & the sine of declination 2249. ẏ difference 7641. which multiplyed by 10000 for the Dividend, is 76410000, the sine of the Complement of the Altitude is 7313. which multiplyed by 6125, ẏ sine of the Complement of ẏ Latitude, the Product is 4550 for the Divisor, and the Quotient is 16789. from which 10000 substracted, the remainer is 6789, the sine of 42 deg. 44 min. the Suns Azimuth from the East Southward.

For the better understanding of this Proposition, take these 5 Cases of Mr. *Handsons*.

1. *For the Suns Azimuth having no Declination.*

ADd the Complement of the *Latitude*, to the Complement of the *Meridian Altitude*, which if the total be more then a Quadrant, substract 90, and set down the Sine of the remainer

for the first number. Again adde the Complement of the *Latitude* and the *Almicanter*, and add the Sine thereof to the former, from the one half of that totall subtract your first Number or Sine, and set down the remainer: Then,

As the ½ of the two first numbers added, is in proportion to the whole sine; so is the said remainer, to the sine of the Suns true *Azimuth*.

Example.

Latit. 51*d* 30′ the Complement 38*d*. 30′ } Added makes 108*d* 30′
Almicanter 20 Complement 70 d. 0′ } 90 sub. leaves 18*d* 30′
whose sine 2173 is the first number. Again, Complement of the *Latitude* 38*d* 30′ *Almicanter* 20*d* added makes 58*d* 30′ whose sine 8526 is the second number, those two numbers added makes 11699 the ½ thereof 5849, from which subtract 3173 the first number, rests 2676 for the remainer: Then say,

As 5849, the ½ of the two first numbers, is to 10000, the whole sine; so is 2676, the remainer, to the *Amizuth* desired.

Facit 4575. Whose Arch 27 d. 17 m. is the *Azimuth* from the East Southward.

2 When the Sun hath North Declination, the two Complements being equall to a Quadrant.

ADd the Complement of *Latitude* with the *Almicanter* only, and from ½ the sine thereof, subtract the sine of the Declination, and setting down the remainer.

As the ½ aforesaid, is to the whole sine; so is the remainer aforesaid, to the sine of the *Azimuth* desired.

3 When the Sun hath North Declination, the two Complements less then a Quadrant.

ADd the Complement of the *Latitude*, & the Complement of the *Almicanter*, setting down the Sine of the Complement thereof, then adde the *Almicanter*, and the complement of the *Latitude*, and from the Sine thereof subtract the former

former, ſetting down half of the remainer for the firſt found number: Again, ſubtract the ſine of the firſt Complement from the ſine of the Declination, and the remainer thereof: Again, ſubtract from your firſt found number, and ſet the remainer thereof down for your ſecond number: and then,

As the firſt found, is to the whole ſine; ſo is the ſecond, to the *Azimuth* deſired.

4 *When the Sun hath North Declination, and the two Complements more then a Quadrant.*

ADde the Complement of the *Latitude*, and Complement of the *Almicanter*, which being more then 90 ſubtract 90, and ſet down the ſine of the remainer, then adde the *Almicanter*, and complement of the *Latitude*, and ſet down the ſine thereof, adde both the ſines together, and take the half thereof for the firſt found number, then to the ſine of the firſt two complements, adde the ſine of the Declination, and from that totall ſubtract the firſt found, and ſet down the remainer for the ſecond found; and then,

As the firſt found, is to the whole ſine; ſo is the ſecond found, to the ſine of the *Azimuth* deſired.

5 *When the Sun hath South Declination, and the two Complemnts more then a Quadrant.*

ADde the complements, ſubtract 90, ſet down the ſine of the remainer, adde alſo the *Almicanter*, and complement of *Latitude*, adde both their ſines, and ſet down half of the totall for the firſt found, then ſubtract the ſine of the declination from the ſine of the remainer of the firſt two complements, and that remainer again from the firſt found, which laſt remainer ſet down and ſay,

As the firſt found, is to the whole ſine; ſo is the ſecond found, to the ſine of the *Azimuth* deſired.

The Latitude given, to find how many Minutes or Miles of the Æquinoctial makes a degree of Longit. in any Parallel.

Prop. 11.

As the whole ſine, is in proportion to 60, ſo is the ſine of complement of the Latitude, to the miles anſwerable to a degree in the Latitude deſired.

A

I desire to know how many Miles in running East or West in the latitude of 51 deg. 40 min. will alter one degree of Longitude; Say,

As	90	gibe	60	what 38.20?
	10000		6202	37

Facit 37 for the number of miles answerable to a degree in the latitude desired.

The Course and distance given, to find out the difference of Latitude.

Prop. 12.

AS the whole Sine is to the miles of way run so is the sine of the Courses distance from East or West, to the min of difference of latitude.

Example.

Runing West Southwest, which is 22 deg. 30 minutes from the West 75 leagues, or 225 miles: I demand the difference of latitude: Say,

As	90	gibe	225	what 22. 30?
	10000		3827	86

Facit. 86 minutes, or one degree 26 minutes, for the difference of Latitude upon the said Course and distance.

By Course and Distance given, to finde the Difference of Longitude.

Prop. 13.

AS the whole line is to the Miles of way that you have run, so is the line of the degree that your Course is distant from South, or North, to the miles that you are departed from your first Meridian.

Running Northwest and by North, which is 28 deg. 45 min. from the North 60 leagues, or 180 miles, I demand the difference of longitude: Say,

As	90	gibe	180	what 33.45?
	10000		5556	100

Facit 100 miles which you are departed from the Meridian to the westward, which if you resolve by the number of miles answerable

swerable to a degree of Longitude, in the Latitude where you then find your selfe to be, the Quotient gives you the deg. and min. of the difference of Longitude.

By the distance and departure from the first Meridian given, to finde the Course.

Prop. 14.

As the miles of distance that you have run, is in proportion to the whole sine; so is the miles of your departure from the Meridian, to the sine of your Course from South or North.

Example.

Being departed from the first Meridian 75 miles, in the running of 50 leagues or 150 miles, I demand upon what point I have sailed; it being betwixt South and West: Say,

As 150 gibe 10000 what 75; 5000

Facit. 5000, whose Arch 30 deg. is the distance from South towards West, that the Course is, which is South-west and by South and Southerly.

The Latitude, declination, and height, of the Sun given, to know the hour of the day.

Prop. 15.

Subtract the sine of the Suns Altitude given out of the sine of the Suns Meridian Altitude (you may finde the meridian Altitude by the eighth Proposition fore-going) and multiply the remainer by 10000 for the Dividend, and multiply the sine of the Complement of the Suns Declination by the sine of the Complement of the Latitude for the Divisor, by which Divisor divide the former Dividend, and if the Quotient be more then 10000, subtract 10000 from it, and the remainer is the sine of the hour wanting of 6 in the Fore-noon, or the hour past 6 in the After-noon; but if the Quotient be lesse then 10000, subtract it from 10000, and the remainer is the sine of the hour past 6 in the Fore-noon, or wanting of 6 in the After-noon.

Example

Example.

In Latitude 51 deg. 30 min. the Declination 15 deg. 0 min. North, the Altitude 43 deg. 0 min. ỳ forenoon, I demaind ỳ hour of the day. The Meridian altitude 53 deg. 30 min. the fine 8038 and the fine of the altitude given 6820, ỳ difference 1218, which multiplied by 10000, is 12180000 for the Dividend, the fine of the Complement of Declination 9659, which multiplied by 6225, the fine of the Complement of the Latitude, the Product is 6012, for the Divisor, and the Quotient is 2025, which substracted from 10000 the remainer is 7975, the fine of 52 deg. 53 min. the hour past 6 in the morning, which being reduced, is 3 hours 31 min. and a halfe added to 6, makes 9 of the clock, and 31 min. and a halfe, the hour of the Day.

To finde the *finus Verſus* of any given Arch.

Prop. 16.

IF the Arch given be leſſe then 90, ſubſtract it from 90, and the Sine of the remainer taken from ỳ total fine, leaves the Sinus Verſus; but if ỳ given Arch be greater then 90 deg. ſubſtract 90 deg. there from, and ſeek the Sine of the remainer, which is alwayes the Complement of the given Arch: which *Sinus* adde to the whole Sine, and the total thereof is the *Sinus* Verſus of the given Arch deſired.

Example

To know the Sinus Verſus of 47 deg. 12 min. the complement therefore is 42 deg, 48 min. whole fine 6794, taken from 10000, the whole fine, reſteth 3206, the reverſed fine 47 degrees, 12 minutes.

Likewiſe, to know the reverſed fine of 137 deg. 25 minutes, which is more then 90 degrees, take 90 there-from, there reſteth 47 deg. 25 minutes. the Sinus whereof 7363 added to the whole Sine, maketh 17363 for the reverſed Sine of 137 degr. 25 min.

A TABLE OF SINES

To a Radius of 10000.

A Table of Sines.

The Degrees of the Quadrant.

M	0	1	2	3	4	5	6	7	8	9	
	I	I	I	I	I	I	I	I	I	I	
1	3	177	352	526	700	874	1048	1222	1395	1567	59
2	6	180	355	529	703	877	1051	1224	1398	1570	58
3	9	183	358	532	706	880	1054	1227	1400	1573	57
4	12	186	361	535	709	883	1057	1230	1403	1576	56
5	14	189	362	538	712	886	1060	1233	1406	1579	55
6	17	192	366	542	715	889	1063	1236	1409	1582	54
7	20	195	369	544	718	892	1065	1239	1412	1584	53
8	23	198	372	547	721	895	1068	1242	1415	1587	52
9	26	201	375	549	724	898	1071	1245	1418	1590	51
10	29	204	378	552	726	900	1074	1247	1421	1593	50
11	32	206	381	555	729	903	1077	1250	1424	1596	49
12	35	209	384	558	732	906	1080	1253	1426	1599	48
13	38	212	387	561	735	909	1083	1256	1429	1602	47
14	41	215	390	564	738	912	1086	1259	1432	1605	46
15	44	218	393	567	741	915	1089	1262	1435	1608	45
16	46	221	395	570	744	918	1091	1265	1438	1610	44
17	49	224	398	573	747	921	1094	1268	1441	1613	43
18	52	227	401	576	750	924	1097	1271	1444	1616	42
19	55	230	404	578	753	927	1100	1273	1446	1619	41
20	58	233	407	581	756	930	1103	1276	1449	1622	40
21	61	235	410	584	758	932	1106	1279	1452	1625	39
22	64	238	413	587	761	935	1109	1282	1455	1627	38
23	67	241	416	590	764	938	1112	1285	1458	1630	37
24	70	244	419	593	767	941	1115	1288	1461	1633	36
25	73	247	422	596	770	944	1118	1291	1464	1636	35
26	76	250	425	599	773	947	1120	1294	1467	1639	34
27	78	253	427	602	776	950	1123	1297	1469	1642	33
28	81	256	430	605	779	953	1126	1299	1472	1645	32
29	84	259	433	607	782	956	1129	1302	1475	1648	31
30	87	262	436	610	785	959	1132	1304	1478	1650	30
	I	I	I	I	I	I	I	I	I	I	
	89	88	87	86	85	84	83	82	81	80	M

A Table of Sines.

The Degrees of the Quadrant.

M	0	1	2	3	4	5	6	7	8	9	
31	90	265	439	613	787	961	1135	1308	1481	1653	29
32	93	268	442	616	790	964	1138	1311	1484	1656	28
33	96	270	445	619	793	967	1141	1314	1487	1659	27
34	99	273	448	622	796	970	1144	1317	1490	1662	26
35	102	276	451	625	799	973	1146	1320	1492	1665	25
36	105	279	454	628	802	976	1149	1322	1495	1668	24
37	107	282	456	631	805	979	1152	1325	1498	1670	23
38	110	285	460	634	808	982	1155	1328	1501	1673	22
39	113	288	462	637	811	985	1158	1331	1504	1676	21
40	116	291	465	640	814	988	1161	1334	1507	1679	20
41	119	294	468	642	816	990	1164	1337	1510	1682	19
42	122	297	471	645	819	993	1167	1340	1513	1685	18
43	125	300	474	648	822	996	1170	1343	1515	1688	17
44	128	302	477	651	825	999	1172	1346	1518	1691	16
45	131	305	480	654	828	1002	1175	1348	1521	1693	15
46	134	308	483	657	831	1005	1178	1351	1524	1696	14
47	137	311	485	660	834	1008	1181	1354	1527	1699	13
48	140	314	488	663	837	1010	1184	1357	1530	1702	12
49	142	317	491	666	840	1013	1187	1360	1533	1705	11
50	145	320	494	668	843	1016	1190	1363	1536	1708	10
51	148	323	497	671	845	1019	1193	1366	1538	1711	9
52	151	326	500	674	848	1022	1196	1369	1541	1714	8
53	154	329	503	677	851	1025	1198	1372	1544	1716	7
54	157	331	506	680	854	1028	1201	1374	1547	1719	6
55	160	334	509	683	857	1031	1204	1377	1550	1722	5
56	163	337	512	686	860	1034	1207	1380	1553	1725	4
57	166	340	515	689	863	1037	1210	1383	1556	1728	3
58	169	343	517	692	866	1039	1213	1386	1559	1731	2
59	172	347	520	695	869	1042	1216	1389	1561	1734	1
60	174	350	523	697	871	1045	1219	1392	1564	1736	0
	89	88	87	86	85	84	83	82	81	80	M

A Table of Sines.

The Degrees of the Quadrant.

M	10	11	12	13	14	15	16	17	18	19	
1	1739	1911	2082	2252	2422	2591	2759	2926	3093	3258	59
2	1742	1914	2085	2255	2425	2594	2762	2929	3096	3261	58
3	1745	1917	2088	2258	2428	2599	2765	2932	3098	3264	57
4	1748	1919	2090	2261	2430	2597	2767	2935	3101	3267	56
5	1751	1922	2093	2264	2433	2602	2770	2938	3104	3269	55
6	1754	1925	2096	2267	2436	2605	2773	2940	3107	3272	54
7	1757	1928	2097	2269	2439	2608	2776	2943	3109	3275	53
8	1759	1931	2109	2272	2442	2611	2779	2946	3112	3278	52
9	1762	1934	2102	2275	2445	2613	2781	2949	3115	3280	51
10	1765	1937	2105	2278	2447	2616	2784	2951	3118	3283	50
11	1768	1939	2110	2281	2450	2619	2787	2954	3120	3286	49
12	1771	1942	2112	2283	2453	2622	2790	2957	3123	3289	48
13	1773	1945	2117	2286	2456	2625	2793	2960	3126	3291	47
14	1776	1948	2119	2289	2459	2628	2795	2963	3129	3294	46
15	1779	1951	2121	2292	2462	2630	2798	2965	3132	3297	45
16	1782	1954	2125	2295	2464	2633	2801	2968	3134	3300	44
17	1785	1957	2127	2298	2467	2636	2804	2971	3137	3302	43
18	1788	1959	2130	2300	2470	2639	2807	2974	3140	3305	42
19	1790	1962	2133	2303	2473	2641	2809	2976	3143	3308	41
20	1793	1965	2136	2306	2476	2644	2812	2979	3146	3311	40
21	1796	1967	2139	2309	2478	2647	2815	2982	3148	3313	39
22	1799	1971	2142	2312	2481	2650	2818	2985	3151	3316	38
23	1802	1974	2145	2315	2484	2653	2821	2988	3154	3319	37
24	1805	1977	2147	2317	2487	2655	2823	2990	3156	3322	36
25	1808	1979	2150	2320	2490	2658	2826	2993	3159	3324	35
26	1810	1982	2153	2323	2492	2661	2829	2996	3162	3327	34
27	1813	1985	2156	2326	2495	2664	2832	2999	3165	3330	33
28	1816	1988	2159	2329	2498	2667	2835	3001	3167	3332	32
29	1819	1991	2161	2331	2501	2669	2837	3004	3170	3335	31
30	1822	1994	2164	2334	2504	2672	2840	3007	3173	3338	30
	79	78	77	76	75	74	73	72	71	70	M

A Table of Sines.

The Degrees of the Quadrant.

M.	10	11	12	13	14	15	16	17	18	19	
31	1825	1996	2167	2337	2507	2675	2843	3010	3176	3341	29
32	1828	1999	2170	2340	2509	2678	2846	3013	3178	3343	28
33	1830	2002	2173	2343	2512	2681	2848	3015	3181	3346	27
34	1833	2005	2176	2346	2515	2683	2851	3018	3184	3349	26
35	1836	2008	2178	2349	2518	2686	2854	3021	3187	3352	25
36	1839	2011	2181	2351	2521	2689	2857	3024	3189	3354	24
37	1842	2014	2184	2354	2524	2692	2860	3026	3192	3357	23
38	1846	2016	2187	2357	2526	2695	2862	3029	3195	3360	22
39	1848	2019	2190	2360	2529	2698	2865	3032	3198	3363	21
40	1850	2022	2193	2363	2532	2700	2868	3035	3201	3365	20
41	1853	2025	2196	2365	2535	2703	2871	3037	3203	3368	19
42	1856	2028	2198	2368	2538	2706	2874	3040	3206	3371	18
43	1859	2031	2201	2371	2540	2709	2876	3043	3209	3374	17
44	1862	2034	2204	2374	2543	2712	2879	3046	3212	3376	16
45	1865	2036	2207	2377	2546	2714	2882	3049	3214	3379	15
46	1868	2039	2210	2380	2549	2717	2885	3051	3217	3382	14
47	1870	204	2213	2382	2552	2720	2887	3954	3220	3385	13
48	1873	2045	2216	2385	2555	2723	2890	3057	3223	3387	12
49	1876	2048	2218	2388	2557	2726	2893	3060	3225	3390	11
50	1879	2051	2221	2391	2560	2728	2896	3062	3228	3393	10
51	1882	2053	2224	2394	2563	2731	2899	3065	3231	3396	9
52	1885	2056	2227	2397	2566	2734	2801	3068	234	3398	8
53	1888	2059	2230	2399	2568	2737	2904	3071	3236	3401	7
54	1890	2062	2232	2402	2571	2740	2907	3073	3239	3404	6
55	1894	2065	2235	2405	2574	2743	2910	3076	3242	3406	5
56	1896	2068	2238	2406	2577	2745	2913	3079	3245	3409	4
57	1899	2070	2241	2411	2580	2748	2915	3082	3248	3412	3
58	1902	2073	2244	2414	2583	2751	2918	3085	3250	3415	2
59	1905	2076	2247	2416	2585	2754	2921	3087	3253	3417	1
60	1908	2079	2249	2419	2588	2756	2924	3090	3256	3420	0
	79	78	77	76	75	74	73	72	71	70	

A Table of Sines.

The Degrees of the Quadrant.

M	20	21	22	23	24	25	26	27	28	29	M
1	3423	3586	3748	3910	4070	4229	4386	4541	4697	4851	59
2	3426	3589	3751	3913	4073	4231	4389	4545	4700	4853	58
3	3428	3592	3754	3915	4075	4234	4391	4548	4702	4856	57
4	3431	3594	3757	3918	4078	4236	4394	4550	4705	4858	56
5	3434	3597	3759	3921	4081	4239	4396	4553	4707	4861	55
6	3437	3600	3762	3923	4083	4242	4399	4555	4710	4863	54
7	3439	3603	3765	3926	4086	4245	4402	4558	4713	4866	53
8	3442	3605	3768	3929	4089	4247	4404	4561	4715	4868	52
9	3445	3608	3770	3931	4091	4250	4407	4563	4718	4871	51
10	3447	3611	3773	3934	4094	4252	4410	4566	4720	4873	50
11	3450	3613	3776	3937	4096	4255	4412	4568	4723	4876	49
12	3453	3616	3778	3939	4099	4258	4415	4571	4725	4878	48
13	3456	3619	3781	3942	4102	4260	4418	4573	4728	4881	47
14	3458	3622	3784	3945	4104	4263	4420	4576	4731	4883	46
15	3461	3624	3786	3947	4107	4266	4423	4579	4733	4886	45
16	3464	3627	3789	3950	4110	4268	4425	4581	4736	4888	44
17	3467	3630	3792	3953	4112	4271	4428	4584	4738	4891	43
18	3469	3632	3794	3955	4115	4274	4431	4586	4741	4893	42
19	3472	3635	3797	3958	4118	4276	4433	4589	4743	4896	41
20	3475	3638	3800	3961	4120	4279	4436	4592	4746	4898	40
21	3477	3641	3803	3963	4123	4281	4438	4594	4748	4901	39
22	3480	3643	3805	3966	4126	4284	4441	4597	4751	4904	38
23	3483	3646	3808	3969	4128	4287	4444	4599	4754	4906	37
24	3486	3649	3811	3971	4131	4289	4446	4602	4756	4909	36
25	3488	3651	3813	3974	4134	4292	4449	4604	4759	4911	35
26	3491	3654	3816	3977	4136	4295	4451	4607	4761	4914	34
27	3494	3657	3819	3979	4139	4297	4454	4610	4764	4916	33
28	3497	3660	3821	3982	4142	4300	4457	4612	4766	4919	32
29	3499	3662	3824	3985	4144	4302	4459	4615	4769	4921	31
30	3502	3665	3827	3987	4147	4305	4462	4617	4771	4924	30
	69	68	67	66	65	64	63	62	61	60	M

A Table of Sines.

The degrees of the Quadrant.

M	20	21	22	23	24	25	26	27	28	29	
31	3503	3668	3829	3990	4149	4308	4464	4620	4774	4927	29
32	3507	3670	3832	3993	4152	4310	4467	4623	4777	4929	28
33	3510	3673	3835	3995	4155	4313	4470	4625	4779	4932	27
34	3513	3676	3837	3998	4157	4316	4472	4628	4782	4934	26
35	3516	3679	3840	4001	4160	4318	4475	4630	4784	4937	25
36	3518	3681	3843	4003	4163	4321	4478	4633	4787	4939	24
37	3521	3684	3846	4006	4165	4324	4480	4635	4789	4942	23
38	3524	3687	3848	4009	4168	4326	4483	4638	4792	4944	22
39	3527	3689	3851	4012	4171	4329	4485	4641	4794	4947	21
40	3529	3692	3854	4014	4173	4331	4488	4643	4797	4949	20
41	3532	3695	3856	4017	4176	4334	4490	4646	4799	4952	19
42	3535	3697	3859	4019	4178	4336	4493	4648	4802	4954	18
43	3537	3700	3862	4022	4181	4339	4496	4651	4808	4957	17
44	3540	3703	3864	4025	4184	4342	4498	4653	4807	4960	16
45	3543	3706	3867	4028	4186	4344	4501	4656	4810	4962	15
46	3546	3708	3870	4030	4189	4347	4503	4659	4812	4965	14
47	3548	3711	3872	4033	4192	4350	4506	4661	4815	4967	13
48	3551	3714	3875	4035	4194	4352	4509	4664	4817	4970	12
49	3554	3716	3878	4038	4197	4355	4511	4666	4820	4972	11
50	3556	3719	3880	4041	4200	4357	4514	4669	4822	4975	10
51	3559	3722	3883	4043	4202	4360	4516	4671	4825	4977	9
52	3562	3724	3886	4046	4205	4363	4519	4674	4828	4980	8
53	3565	3727	3888	4049	4208	4365	4522	4677	4830	4982	7
54	3567	3730	3891	4051	4210	4368	4524	4679	4833	4985	6
55	3570	3732	3894	4054	4213	4371	4527	4682	4835	4987	5
56	3573	3735	3896	4057	4216	4373	4529	4684	4838	4990	4
57	3575	3738	3899	4059	4218	4376	4532	4687	4840	4992	3
58	3578	3741	3902	4062	4221	4378	4535	4689	4843	4995	2
59	3581	3743	3905	4065	4224	4381	4537	4692	4845	4997	1
60	3584	3746	3908	4067	4226	4384	4540	4695	4848	5000	0
M	69	68	67	66	65	64	63	62	61	60	M

A Table of Sines.

The degrees of the Quadrant.

M	30	31	32	33	34	35	36	37	
1	5002	5153	5302	5449	5594	5738	5880	6020	59
2	5005	5155	5304	5451	5597	5740	5882	6023	58
3	5007	5158	5306	5454	5599	5743	5885	6025	57
4	5010	5160	5309	5456	5601	5745	5887	6027	56
5	5012	5163	5311	5458	5604	5748	5890	6030	55
6	5015	5165	5314	5461	5606	5750	5892	6032	54
7	5017	5168	5316	5463	5609	5752	5894	6034	53
8	5020	5170	5319	5466	5611	5755	5896	6037	52
9	5022	5173	5321	5468	5614	5757	5899	6039	51
10	5025	5175	5324	5471	5616	5759	5901	6041	50
11	5027	5178	5326	5473	5618	5762	5904	6044	49
12	5030	5180	5329	5476	5621	5764	5906	6046	48
13	5032	5183	5331	5478	5623	5767	5909	6048	47
14	5035	5185	5334	5480	5625	5769	5911	6051	46
15	5038	5188	5336	5483	5628	5771	5913	6053	45
16	5040	5190	5339	5485	5630	5774	5915	6055	44
17	5042	5193	5341	5488	5633	5776	5918	6057	43
18	5045	5195	5343	5490	5635	5778	5920	6060	42
19	5048	5198	5346	5493	5638	5781	5922	6062	41
20	5050	5200	5348	5495	5640	5783	5925	6064	40
21	5053	5203	5351	5497	5642	5785	5927	6067	39
22	5055	5205	5353	5500	5645	5788	5929	6069	38
23	5058	5208	5356	5502	5647	5790	5932	6071	37
24	5060	5210	5358	5505	5650	5793	5934	6074	36
25	5063	5213	5361	5507	5652	5795	5936	6076	35
26	5065	5215	5364	5509	5654	5797	5939	6078	34
27	5068	5217	5366	5512	5657	5800	5941	6081	33
28	5070	5220	5368	5514	5659	5802	5943	6083	32
29	5073	5221	5370	5517	5662	5805	5946	6085	31
30	5075	5225	5373	5519	5664	5807	5949	6088	30
	59	58	57	56	55	54	53	52	M

A Table of Sines.

The Degrees of the Quadrant.

M	30	31	32	33	34	35	36	37	M
31	5078	5227	5375	5522	5669	5809	5950	6090	29
32	5080	5230	5378	5524	5669	5812	5953	6092	28
33	5083	5232	5380	5527	5671	5814	5955	6094	27
34	5085	5235	5383	5529	5674	5816	5957	6097	26
35	5088	5237	5385	5531	5676	5819	5960	6099	25
36	5090	5240	5388	5534	5678	5821	5962	6101	24
37	5093	5242	5390	5536	5681	5823	5964	6104	23
38	5095	5245	5393	5539	5683	5826	5967	6106	22
39	5098	5247	5395	5541	5685	5828	5969	6108	21
40	5100	5250	5397	5543	5688	5831	5971	6111	20
41	5103	5252	5400	5546	5690	5833	5975	6114	19
42	5105	5255	5402	5548	5693	5835	5978	6117	18
43	5108	5257	5404	5551	5695	5838	5980	6119	17
44	5110	5260	5407	5553	5697	5840	5982	6121	16
45	5113	5262	5410	5556	5700	5842	5985	6123	15
46	5115	5265	5412	5558	5702	5845	5986	6124	14
47	5118	5267	5415	5560	5705	5847	5988	6127	13
48	5120	5269	5417	5563	5707	5848	5990	6129	12
49	5123	5272	5419	5565	5709	5851	5993	6131	11
50	5125	5274	5422	5568	5712	5854	5995	6134	10
51	5128	5277	5424	5570	5714	5856	5997	6136	9
52	5130	5279	5427	5573	5717	5859	5999	6138	8
53	5133	5282	5429	5575	5719	5861	6002	6140	7
54	5135	5284	5431	5577	5721	5864	6004	6143	6
55	5138	5287	5434	5580	5724	5866	6006	6145	5
56	5140	5289	5437	5582	5726	5868	6009	6147	4
57	5143	5292	5439	5585	5729	5871	6011	6149	3
58	5145	5294	5441	5587	5731	5873	6013	6152	2
59	5148	5297	5444	5589	5733	5875	6016	6154	1
60	5150	5299	5446	5592	5736	5878	6018	6156	0
M	59	58	57	56	55	54	53	52	M

A Table of Sines.

The Degrees of the Quadrant.

M	38	39	40	41	42	43	44	45	M
1	6159	6295	6430	6563	6694	6822	6949	7073	59
2	6161	6298	6432	6565	6696	6824	6951	7075	58
3	6163	6300	6434	6567	6698	6826	6953	7077	57
4	6166	6302	6437	6569	6700	6828	6955	7079	56
5	6168	6304	6439	6571	6702	6831	6957	7081	55
6	6170	6307	6441	6574	6704	6833	6959	7083	54
7	6173	6309	6443	6576	6706	6835	6961	7085	53
8	6175	6311	6446	6578	6708	6837	6963	7087	52
9	6177	6313	6448	6580	6711	6839	6965	7089	51
10	6179	6316	6450	6583	6713	6841	6967	7092	50
11	6182	6318	6452	6585	6715	6843	6969	7094	49
12	6184	6320	6454	6587	6717	6845	6972	7096	48
13	6186	6322	6457	6589	6719	6848	6974	7098	47
14	6189	6325	6459	6591	6721	6850	6976	7100	46
15	6191	6327	6461	6593	6724	6852	6978	7102	45
16	6193	6329	6463	6596	6726	6854	6980	7104	44
17	6195	6331	6466	6598	6728	6856	6982	7106	43
18	6198	6334	6468	6600	6730	6858	6984	7108	42
19	6200	6336	6470	6602	6732	6860	6986	7110	41
20	6202	6338	6472	6604	6734	6862	6988	7112	40
21	6205	6340	6474	6606	6736	6864	6990	7114	39
22	6207	6343	6477	6609	6738	6867	6992	7116	38
23	6209	6345	6479	6611	6741	6869	6994	7118	37
24	6211	6347	6481	6613	6743	6871	6997	7120	36
25	6213	6349	6483	6615	6745	6874	6999	7122	35
26	6216	6352	6486	6617	6747	6875	7001	7124	34
27	6218	6354	6488	6619	6749	6877	7003	7126	33
28	6220	6356	6490	6622	6752	6879	7005	7128	32
29	6223	6358	6492	6624	6754	6881	7007	7130	31
30	6225	6361	6494	6626	6756	6884	7009	7132	30
	51	50	49	48	47	46	45	44	

A Table of Sines.

The Degrees of the Quadrant.

M	38	39	40	41	42	43	44	45	M
31	6227	6363	6497	6628	6758	6886	7011	7134	29
32	6230	6365	6499	6630	6760	6888	7013	7136	28
33	6232	6367	6501	6633	6762	6890	7015	7139	27
34	6234	6370	6503	6635	6764	6892	7017	7141	26
35	6236	6372	6505	6637	6766	6894	7019	7143	25
36	6239	6374	6508	6639	6769	6896	7021	7145	24
37	6241	6376	6510	6641	6771	6898	7023	7147	23
38	6243	6379	6512	6644	6773	6900	7026	7149	22
39	6245	6381	6514	6646	6775	6902	7028	7151	21
40	6248	6383	6516	6648	6777	6905	7030	7153	20
41	6250	6385	6519	6650	6779	6907	7032	7155	19
42	6252	6387	6521	6652	6781	6909	7034	7157	18
43	6255	6390	6523	6654	6783	6911	7036	7159	17
44	6257	6392	6525	6657	6786	6913	7038	7161	16
45	6259	6394	6527	6659	6788	6915	7040	7163	15
46	6261	6396	6530	6661	6790	6917	7042	7165	14
47	6264	6399	6532	6663	6792	6919	7044	7167	13
48	6266	6401	6534	6665	6794	6921	7046	7169	12
49	6268	6403	6536	6667	6796	6923	7048	7171	11
50	6270	6405	6539	6670	6799	6925	7050	7173	10
51	6273	6408	6541	6672	6801	6928	7052	7175	9
52	6275	6410	6543	6674	6803	6930	7054	7177	8
53	6277	6412	6545	6676	6805	6932	7057	7179	7
54	6279	6414	6547	6678	6807	6934	7059	7181	6
55	6282	6417	6550	6680	6809	6936	7061	7183	5
56	6284	6419	6552	6683	6811	6938	7063	7185	4
57	6286	6421	6554	6685	6813	6940	7065	7187	3
58	6289	6423	6556	6687	6816	6942	7067	7189	2
59	6291	6426	6558	6689	6818	6944	7069	7191	1
60	6293	6428	6560	6691	6820	6946	7071	7193	0
M	51	50	49	48	47	46	45	44	M

A Table of Sines.

The Degrees of the Quadrant.

M	46	47	48	49	50	51	52	53	
1	7195	7315	7433	7549	7662	7773	7882	7988	59
2	7198	7317	7435	7551	7664	7775	7884	7990	58
3	7199	7319	7437	7553	7666	7777	7885	7992	57
4	7201	7321	7439	7555	7668	7779	7887	7993	56
5	7203	7323	7441	7557	7670	7781	7889	7995	55
6	7205	7325	7443	7559	7672	7782	7891	7997	54
7	7207	7327	7445	7560	7673	7784	7893	7998	53
8	7209	7329	7447	7562	7675	7786	7894	8000	52
9	7211	7331	7449	7564	7677	7788	7896	8002	51
10	7213	7334	7451	7566	7679	7790	7898	8004	50
11	7215	7335	7453	7568	7681	7791	7900	8005	49
12	7218	7337	7455	7570	7683	7793	7901	8007	48
13	7220	7339	7457	7572	7685	7795	7903	8009	47
14	7222	7341	7459	7574	7687	7797	7905	8011	46
15	7224	7343	7461	7576	7688	7799	7907	8012	45
16	7226	7345	7463	7577	7690	7801	7909	8014	44
17	7228	7347	7464	7579	7692	7803	7910	8016	43
18	7230	7349	7466	7581	7694	7804	7912	8018	42
19	7232	7351	7468	7583	7696	7806	7914	8019	41
20	7234	7353	7470	7585	7698	7808	7916	8021	40
21	7236	7355	7472	7587	7700	7810	7918	8023	39
22	7238	7357	7474	7589	7701	7811	7919	8025	38
23	7240	7359	7476	7591	7703	7813	7921	8026	37
24	7242	7361	7478	7593	7705	7815	7923	8028	36
25	7244	7363	7480	7595	7707	7817	7925	8030	35
26	7246	7365	7482	7596	7709	7819	7927	8032	34
27	7248	7367	7484	7598	7711	7821	7928	8033	33
28	7250	7369	7486	7600	7712	7822	7930	8035	32
29	7252	7371	7488	7602	7714	7824	7932	8037	31
30	7254	7373	7490	7604	7716	7826	7933	8038	30
M	43	42	41	40	39	38	37	36	M

A Table of Sines.

The Degrees of the Quadrant.

M	45	47	48	49	50	51	52	53	M
31	72 56	73 78	74 91	76 06	77 18	78 28	79 35	80 40	29
32	72 58	73 77	74 92	76 08	77 20	78 30	79 37	80 42	28
33	72 60	73 79	74 95	76 10	77 22	78 32	79 39	80 44	27
34	72 62	73 81	74 97	76 12	77 24	78 33	79 41	80 45	26
35	72 64	73 82	74 99	76 14	77 25	78 35	79 42	80 47	25
36	72 66	73 84	75 01	76 15	77 27	78 37	79 44	80 49	24
37	72 68	73 86	75 03	76 17	77 29	78 39	79 46	80 51	23
38	72 70	73 88	75 05	76 19	77 31	78 40	79 48	80 52	22
39	72 72	73 90	75 07	76 21	77 33	78 42	79 49	80 54	21
40	72 74	73 92	75 09	76 23	77 35	78 44	79 51	80 56	20
41	72 76	73 94	75 11	76 25	77 37	78 46	79 53	80 58	19
42	72 78	73 96	75 13	76 27	77 39	78 48	79 55	80 59	18
43	72 80	73 97	75 14	76 29	77 40	78 49	79 56	80 61	17
44	72 82	73 99	75 16	76 30	77 42	78 51	79 58	80 63	16
45	72 84	74 01	75 18	76 32	77 44	78 53	79 60	80 64	15
46	72 86	74 03	75 20	76 34	77 46	78 55	79 62	80 66	14
47	72 88	74 05	75 22	76 36	77 48	78 57	79 63	80 68	13
48	72 90	74 08	75 24	76 38	77 50	78 58	79 65	80 70	12
49	72 92	74 10	75 26	76 40	77 51	78 60	79 67	80 71	11
50	72 94	74 12	75 28	76 42	77 53	78 62	79 69	80 73	10
51	72 96	74 14	75 30	76 44	77 55	78 64	79 70	80 75	9
52	72 98	74 16	75 32	76 45	77 57	78 66	79 72	80 76	8
53	73 00	74 18	75 34	76 47	77 59	78 67	79 74	80 78	7
54	73 01	74 20	75 36	76 49	78 00	78 69	79 76	80 80	6
55	73 03	74 22	75 37	76 51	78 02	78 71	79 77	80 82	5
56	73 05	74 24	75 39	76 53	78 04	78 73	79 79	80 83	4
57	73 07	74 26	75 41	76 55	78 06	78 75	79 81	80 85	3
58	73 09	74 28	75 43	76 57	78 08	78 76	79 83	80 87	2
59	73 11	74 29	75 45	76 59	78 10	78 78	79 85	80 88	1
60	73 13	74 31	75 47	77 00	78 12	78 80	79 86	80 90	0
M	45	47	48	49	50	51	52	53	M
	43	42	42	40	39	38	37	36	

A Table of Sines.

The degrees of the Quadrant.

M	54	55	56	57	58	59	60	
1	8092	8193	8293	8388	8482	8573	8662	59
2	8094	8195	8294	8390	8483	8575	8663	58
3	8095	8197	8295	8391	8485	8576	8665	57
4	8097	8198	8297	8393	8487	8578	8666	56
5	8099	8200	8298	8395	8489	8579	8668	55
6	8100	8201	8300	8396	8490	8581	8669	54
7	8102	8203	8302	8398	8491	8582	8670	53
8	8104	8205	8304	8399	8493	8584	8672	52
9	8105	8206	8305	8401	8494	8585	8673	51
10	8107	8208	8307	8402	8496	8587	8675	50
11	8109	8210	8308	8404	8497	8588	8676	49
12	8111	8212	8310	8406	8499	8590	8678	48
13	8112	8213	8311	8407	8500	8591	8679	47
14	8114	8215	8313	8409	8502	8593	8681	46
15	8116	8216	8315	8410	8503	8594	8682	45
16	8117	8218	8316	8412	8504	8596	8684	44
17	8119	8220	8318	8414	8506	8597	8685	43
18	8121	8221	8319	8415	8507	8599	8687	42
19	8122	8223	8321	8417	8509	8600	8688	41
20	8124	8225	8323	8418	8511	8602	8690	40
21	8126	8226	8324	8420	8513	8603	8691	39
22	8128	8228	8326	8421	8514	8605	8692	38
23	8129	8230	8328	8423	8516	8606	8694	37
24	8131	8231	8329	8424	8517	8607	8695	36
25	8133	8233	8331	8426	8519	8608	8697	35
26	8134	8235	8332	8428	8520	8610	8698	34
27	8136	8236	8334	8429	8522	8612	8699	33
28	8138	8238	8336	8431	8523	8613	8701	32
29	8139	8240	8337	8432	8525	8615	8702	31
30	8141	8241	8339	8434	8526	8616	8704	30
	35	34	33	32	31	30	29	M

A Table of Sines.

The Degrees of the Quadrant.

M	54	55	56	57	58	59	60	M
31	8143	8243	8340	8435	8528	8618	8705	29
32	8144	8245	8342	8437	8529	8619	8706	28
33	8146	8246	8344	8438	8531	8621	8708	27
34	8148	8248	8346	8440	8532	8622	8709	26
35	8149	8249	8347	8442	8533	8623	8711	25
36	8151	8251	8348	8443	8536	8625	8712	24
37	8153	8253	8350	8445	8537	8627	8713	23
38	8155	8254	8352	8446	8539	8629	8715	22
39	8156	8256	8353	8448	8540	8630	8716	21
40	8158	8257	8355	8449	8541	8631	8718	20
41	8160	8259	8356	8451	8543	8633	8719	19
42	8161	8261	8358	8452	8545	8634	8720	18
43	8163	8263	8360	8454	8546	8636	8722	17
44	8165	8264	8361	8455	8548	8637	8724	16
45	8166	8266	8362	8457	8549	8638	8725	15
46	8168	8267	8364	8458	8551	8640	8726	14
47	8170	8269	8366	8460	8552	8641	8728	13
48	8171	8271	8367	8462	8554	8643	8729	12
49	8172	8272	8369	8463	8555	8644	8731	11
50	8174	8274	8371	8465	8557	8646	8732	10
51	8176	8276	8372	8466	8558	8647	8733	9
52	8178	8277	8374	8468	8560	8648	8739	8
53	8180	8279	8375	8470	8561	8650	8736	7
54	8181	8281	8377	8471	8563	8651	8738	6
55	8183	8282	8379	8473	8565	8653	8739	5
56	8185	8284	8380	8474	8566	8655	8740	4
57	8186	8285	8382	8476	8567	8656	8742	3
58	8188	8287	8383	8477	8568	8657	8743	2
59	8190	8281	8385	8479	8570	8659	8745	1
60	8191	8290	8387	8480	8572	8660	8746	0
M	35	34	33	32	31	30	29	

A Table of Sines.

The degrees of the Quadrant.

M	61	62	63	64	65	66	67	M
1								
	8749	8832	8913	8990	9065	9138	9207	58
2								
	8752	8835	8915	8993	9068	9140	9209	56
4								
	8755	8838	8918	8995	9070	9142	9212	54
6								
	8758	8841	8921	8998	9073	9145	9214	52
8								
	8760	8843	8923	9000	9075	9147	9216	50
10								
	8763	8846	8926	9003	9078	9149	9218	48
12								
	8766	8849	8928	9005	9080	9152	9221	46
14								
	8769	8852	8931	9008	9083	9154	9223	44
16								
	8771	8854	8934	9011	9085	9156	9225	42
18								
	8774	8857	8936	9013	9087	9159	9228	40
20								
	8777	8860	8939	9016	9090	9161	9230	38
22								
	8780	8862	8941	9018	9092	9164	9232	36
24								
	8783	8865	8944	9021	9095	9166	9234	64
26								
	8785	8867	8947	9023	9098	9168	9236	32
28								
	8788	8870	8949	9026	9100	9171	9239	30
30								
	8791	8873	8952	9028	9102	9173	9241	28
32								
	8794	8875	8954	9031	9104	9175	9243	26
34								
	8796	8878	8957	9033	9107	9177	9245	24
36								
	8799	8880	8960	9036	9109	9180	9247	22
38								
	8802	8883	8962	9038	9112	9182	9250	20
40								
	8801	8886	8965	9041	9114	9184	9252	18
42								
	8808	8889	8967	9043	9116	9187	9254	16
44								
	8810	8891	8970	9046	9119	9189	9256	14
46								
	8813	8894	8972	9048	9121	9191	9259	12
48								
	8816	8897	8975	9051	9123	9194	9261	10
50								
	8819	8899	8978	9054	9126	9196	9263	8
52								
	8821	8902	8980	9056	9128	9198	9265	6
54								
	8824	8905	8983	9059	9131	9200	9267	4
56								
	8827	8907	8985	9061	9133	9203	9270	2
58								
	8830	8910	8988	9064	9135	9205	9272	0
60								
M	28	27	26	25	24	23	22	M

A Table of Sines.

The degrees of the Quadrant.

M	68	69	70	71	72	73	74	
2	9272	9338	9399	9457	9512	9565	9614	58
4	9276	9340	9401	9459	9514	9566	9616	56
6	9278	9342	9403	9461	9516	9568	9617	54
8	9280	9344	9405	9463	9518	9570	9619	52
10	9283	9346	9407	9465	9519	9571	9620	50
12	9285	9348	9409	9466	9521	9573	9622	48
14	9287	9351	9411	9468	9523	9575	9624	46
16	9289	9352	9413	9470	9525	9576	9625	44
18	9291	9354	9415	9472	9527	9578	9627	42
20	9263	9356	9417	9474	9528	9580	9528	40
22	9296	9358	9419	9476	9530	9581	9630	38
24	9298	9360	9420	9478	9532	9583	9632	36
26	9300	9363	9422	9480	9534	9585	9633	34
28	9302	9365	9424	9481	9535	9586	9635	32
30	9304	9367	9426	9483	9537	9588	9636	30
32	9306	9369	9428	9485	9539	9590	9638	28
34	9308	9371	9430	9487	9540	9591	9639	26
36	9310	9373	9432	9489	9542	9593	9641	24
38	9313	9375	9434	9491	9544	9595	9642	22
40	9315	9377	9436	9492	9546	9596	9644	20
42	9317	9380	9438	9494	9548	9598	9645	18
44	9319	9381	9440	9496	9549	9600	9647	16
46	9321	9383	9442	9498	9551	9601	9648	14
48	9323	9385	9444	9500	9553	9603	9650	12
50	9325	9387	9446	9501	9554	5604	9651	10
52	9327	9389	9447	9503	9556	9606	9653	8
54	9329	9391	9449	9505	9558	9608	9655	6
56	9332	9393	9451	9507	9559	9609	9656	4
58	9334	9395	9453	9509	9561	9611	9658	2
60	9336	9397	9455	9510	9563	9613	9659	0
M	21	20	19	18	17	16	15	

A Table of Sines.

The Degrees of the Quadrant.

M	75	76	77	78	79	80	81	82	
5	9663	9706	9747	9784	9819	9850	9879	9905	55
10	9667	9710	9750	9787	9822	9853	9881	9907	50
15	9670	9713	9753	9790	9824	9855	9884	9909	45
20	9674	9717	9756	9793	9827	9858	9886	9911	40
25	9678	9720	9760	9796	9830	9860	9888	9912	35
30	9681	9724	9763	9799	9832	9863	9890	9914	30
35	9685	9727	9766	9802	9835	9865	9892	9916	25
40	9689	9730	9769	9805	9838	9868	9894	9918	20
45	9692	9734	9772	9808	9840	9870	9896	9920	15
50	9696	9737	9775	9811	9843	9872	9898	9922	10
55	9699	9740	9777	9813	9846	9874	9900	9924	5
60	9703	9745	9781	9816	9848	9877	9903	9925	0
	14	13	12	11	10	9	8	7	M

The Degrees of the Quadrant.

M	83	84	85	86	87	88	89	
5	9927	9947	9963	9977	9987	9994	9998	55
10	9929	9948	9964	9978	9988	9995	9998	50
15	9931	9950	9965	9978	9988	9995	9999	45
20	9932	9951	9967	9979	9989	9996	9999	40
25	9934	9952	9968	9980	9990	9996	9999	35
30	9936	9954	9969	9981	9990	9996	9999	30
35	9937	9955	9970	9982	9991	9997	9999	25
40	9939	9957	9971	9983	9992	9997	9999	20
45	9940	9958	9972	9984	9992	9998	9999	15
50	9942	9959	9973	9984	9993	9998	10000	10
55	9944	9960	9975	9985	9993	9998	10000	5
60	9945	9962	9976	9985	9994	9998	10000	0
	6	5	4	3	2	1	0	M

The Extraction of Roots.

IT is not necessary, before we do enter into this order and method of teaching how to extract a Root, to shew the divers kinds and their definitions: Therefore you must know that of Roots there are sundry sorts, according to the quantities from which they are derived as the *Square* Cubes, *Squared* Squares, *Surdsolids*, &c. for the numbers receive their names of the said quantities, every quantity having his Root, which may be called the first quantity, Because it is the side or beginning of the quantity whereunto it is set: Numbers of the second quantity are called *Square*s; of the third, Cubes; of the fourth Squared Squares, as before, wherein you may proceed infinitely if you will; but you shall seldome or never have use for the extraction of the Root of any quantity more then Squares and *Cubes*, A *Square* number is the Product of any number multiplyed in it selfe; and the Root thereof is the multiplier, whereby the same square number is produced: As for example, 4 is a square number coming of the multiplication of 2 in it self which is the Root thereof.

A Cubick number is the product of a number multiplied into it selfe, & the same Product multiplied again by the first number; As 2 multiplied by it selfe is 4, that Product multiplyed again by 2 the first number, makes 8, which is a Cubick number, and the Root thereof.

A Squared square number is produced of 3 multiplications; first any number by it selfe makes a Square number, that Product again by the first root or multiplyer makes a cubick number: & lastly, that Product again by the first Figure or root, produceth a Squared square number, as 2 multiplyed in it self makes 4 a square number, that again by 2, makes 8, which is a Cubick number, and then that product again by two, produceth 16, which is a Squared square number, and the root thereof is 2. Surdsolid number is the product of a number multiplyed four times by the root thereof as 32 is a Surdsolid number, the Root whereof is 2: for 2 multiplyed in it self is 4 that multiplyed again by 2 is 8, the same product again by 2, makes 16; and lastly, the same Product multiplied by the first number 2, makes 32. Therefore I

conclude that 32 is a Surdsolid number, and the number 2, whereby the said number is produced, is the Surdsolid root to the said number: and thus multiplying the last product by the first number or Root you may proceed infinitely, but more then these are needlesse, and as I said before, without any great or common use.

Now for the finding of the root, it must be done according to the quantity whereof it taketh denomination, as whether it be of a Square or Cube, or otherwise: which known, let us proceed to the working thereof.

You must understand that the order of extracting the Root of any quantity, is not much unlike to Division; differing onely in this, that whereas in Division the Divisor is known, but here it is to find: also in Division you alwayes keep one Divisor, but in this you must change your Divisor at each removing, which is at the finding of every figure contained in the Root. Now therefore I will lay down one general way for the Extraction of the root of all quantities whatsoever, which is done by certain numbers applyed to each several quantity which are these: For the Square root is one number required, which is 20. For the Cube two numbers, which are 300 and 30. For the Squared Square three numbers, viz. 4000, 400, and 40.

Thus having declared the kinds, numbers, quantities, and order of the Extraction of all sorts of Roots, it followeth that we proceed to the practice thereof: And first, to extract the Square root of any number, you must consider as before I have said, that 20 is the number for the same quantity: Also you must learn by memory the just square of all the 9 Unites, which if you know not, this Table will stand you in some stead: where you see that against every of the 9 Unites aforesaid, towards the right hand is the square of that unity against which it doth stand: which known, set down the number whereof you would extract the square root, then under the last figure at the right hand put a prick, and then proceeding towards the left hand under every second figure put a prick & done, draw with your pen a quotient, as in Division: Now for to find the root of your given number, seek the greatest square

1	1
2	4
3	9
4	16
5	25
6	36
7	49
8	64
9	81

ſquare number contained in the number ober the firſt prick, that ſquare number take from the number ober the ſaid firſt prick, and ſet the remainer ober it the root of which ſquare number put in the quotient for ꝑ figure of the root, that root multiply by 20, the number for the ſquare root, and then look how often the Product thereof may be taken from the number ober or to ꝑ left hand of the ſecond prick, which put in your quotient for your ſecond figure of the root: but this is to be noted for a general rule, that you muſt take no greater number for your ſecond figure then that the ſquare thereof added with the former product, may be taken from the number ober the ſaid ſecond prick, and alſo look how many pricks are under your given number, ſo many figures muſt be in the quotient for the root of the ſaid number: then having found two figures in ꝑ quotient, if there be any more pricks, multiply the whole number in the quotient by 20, and ſeek how often the Product thereof may be taken from the number ober or belonging to the next prick, which number put in the quotient, and adding the ſquare thereof to the former product, ſubſtract the whole ſum from the number ober the ſaid prick, & cancelling the ſaid number, as at each remove you muſt do, ſet the remainer ober it, and if there be any more pricks undone, do as you did before, alwayes multiplying the quotient by 20, thereto adding the ſquare of the laſt figure, and the total ſum being ſubtracted from the laſt remainer, if there reſts nothing, it is a ſquare number, or elſe not; which you may prove, if you multiply the root by it ſelf ſquarely, for the root being truly extracted will produce the firſt given number. But becauſe that examples are eaſieſt for the underſtanding: let 104976 be a given number, whereof I would know ꝑ ſquare root, viz. what number being multiplied in it ſelf will produce the aforeſaid number of 104976. Therefore, firſt, I ſet down the ſaid number, and under the laſt figure towards the right hand, which in this example is 6, I put a prick or point, another under the 9, and laſtly, another under 0, leaving one figure betwixt every prick: which done, and the quotient drawn, the given number will ſtand thus: whereby I ſee that the Root of the ſaid number muſt conſiſt of 3 figures, becauſe it hath 3 pricks under it: then I ſeek

104976(
. . .

the

the greatest square number is 10, it being the number belonging to the first prick toward the left hand, that I finde to be 9, which is produced of 3 multiplied squarely, therefore I put 3 in the quotient for the first figure of the root, and the square thereof being 9, I subtract from 10, the number over the first prick; & there rests 1. The order of which work will stand thus: where you see that the figures over the first prick are cancelled, there is 3 in the Quotient for the first figure of the Root, and 1 rests, which with the figures betwixt it and the next prick, make 149 for the number of the second prick.

```
 1
10 4976(3
 9
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Now for the second figure of the Root, I multiply the root already found by 20, & the product is 60, that I seek how often I may take from 149, the number over the second prick, which I may do 2 times, for 2 times 60 is 120, whereunto the square of 2 which is 4 being added, makes 124, that subtracted from 149, leaves 25, therefore I put 2 in the quotient for ye second figure of the root, & cancelling the figures over the second prick, the remainer being put over it, the working hereof wil stand in this order, where you see the quotient is 32 for the two first figures of the root, and ye figures of the two first pricks being cancell'd, there rests 25, which with the other figures betwixt them and ye third and last prick, makes 2576, for the number over the last prick.

```
125
104976)32
 9
124
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```
 20
  3
 60
  2
120
  4
124
```

```
128
104976(324
 9
124
```

Now therefore to finde the last figure of the root, I multiply the root already found, that is to say, 32 by 20, & the Product thereof is 640, that I seek how often it may be taken out of 2576, the number over ye last prick, which may be done 4 times, for 4 times 640 is 2560, whereunto if I adde ye square of 2, there will amount 2576; which because it may be taken from ye number remaining over ye last prick, I put 4 in ye quotient for the last figure of ye root, & substracting the former Product of 2576, from ye number over ye last prick, which is likewise 2576, there will rest nothing

```
2576
  32
  20
 640
   4
2560
  16
2576
```

thing, therefore I cancel those figures likewise, and thereby conclude 104976 to be a square number, and 324 to be the root thereof,

The proofe whereof is by multiplying the root into it selfe squarely: for if you multiply 324 by 324, the product will be 104976, which was the first given number and shews the number to be a square number.

```
  324
  324
 1296
  648
 972
104976
```

I doubt not, but to any indifferent conceit this Example will suffice, as well as if I should contribe a whole Volume thereof, when it is so, that a given number is a right square number. But if the number given be not a square number, it is impossible to find an exact root thereto, but that after the work there will remain something as a fraction or part of a number more to be added to the quotient: for the true and perfect valuation of which fraction or remainer, none as yet could attain: but they have set down so near a way for the extraction of the root of any number not being a square number, that thereby no great errour may be perceived. For the knowledge and better understanding of which, let this be a familiar Example. You know that 16 is a right square number, and the square root thereof is 4. But if you would extract the Square root of 18, you should have 4 in your quotient likewise for the root thereof, but then there will rest 2, whereby you see that 18 is no square number, neither can you know what fraction to make of it, by reason that you have no certain Divisor, that might stand for Demominator to the numerator or Remainer: Onely let this suffice that to finde the neerest root thereof the Rule is thus, Double the remainer for the numerator, and Quadruple, viz multiply the root by 4 and thereto add 1 for the Denominator to the said Numerator, as in this Example, To extract the neerest square root of 18 I find 4 to be in the quotient, and 2 remaining, which 2 being doubled, makes 4 for the Numerator and 4 the root being multiplyed by 4 makes 16 and 1 added therewith makes 17 for the Denominator, whereby I say, that $4\frac{4}{17}$ is the neerest square root of 18, which may be found out: For if you reduce $4\frac{4}{17}$ into one common denomination.

```
18(4 4/17
16
```

and

and then multiply them squarely, the Product will be 17 $\frac{15}{16}$ which is but $\frac{15}{16}$ too little.

Thus having declared the order how to extract the square root of any number, it resteth now that I shew the manner of extracting the Cube root of any number: As for the principal uses thereof you shall find in the general practice of the Mathematicks, But some few uses of them I have inserted after the extraction of the Cube root.

To finde out the Cube root of any given number, being a right Cube number: first, put down the given number, and as in the square number you put points or pricks, beginning at the right hand, and so towards the left, leaving betwixt each point one figure void: so in the extraction of the root of a cube number, you must leave 2 figures void or unprickt betwixt every point: and as in the square root, so likewise in this: look how many points are under the given number, so many figures must be contained in the Root thereof, which is also to be observed in extracting the root of any quantity whatsoever,

These things being considered, it is also necessary, that you know the greatest cubick number of every of the nine unites, whereof the Table in the margent maketh explanation: where you see that against each unity standeth the cube number thereof: which being known, and the given number prickt, with a quotient drawn as before I have shewed. To extract the cube root you have two numbers, viz. 300 and 30. But because the working thereof would be too long to expresse in terms,

1...	1
2...	8
3...	27
4...	64
5...	125
6...	216
7...	343
8...	512
9...	729

Let 12487168 be a given number, whereof I would extract the Cube Root. First having pricked it, and drawn a Quotient for the Root, as in the Margent, I see that the root must consist of three figures, so many pricks being under the number given. For the finding of which figures I seeke first the greatest Cube number in 12, the number over the first prick, which is 8, the root whereof being 2, I put in the Quotient, and setting 8, the Cube thereof under 12, and substracting it from it; there remains 4.

4
12487168(2,
8

Then

Then for the second figure of the root, I put down 300 and 30, the numbers for the Cube root, and against 30 I set 2, the first figure of the Root found, and against 300 I set 4, which is the square thereof; and multiplying 300 by 4, the product is 1200: then I consider how often I may take this number 1200: from the number over the second prick, which is 4487, and I find it may be taken 3 times, therefore I put 3 in the quotient for the second figure of the root, and likewise after the number 300, and the square thereof which is 9, I put after 30, & the Cube thereof which is 27, I put under 30: Then I multiply all the numbers in the first row each by other, viz. 4 by 300 makes 1200, and that by 3, makes 3600, which I set by it selfe. Then I multiply 2 by 30, which makes 60, and that by 9 which makes 540, which I put under the other product, lastly because 27 hath no number with it I set it down under the two former products, and adding them together, the sum thereof is 4167 which I set in order under the figures of the second prick, & substracting it from them, there remains 320 to be joyned to the number over the third prick; which makes it 320168.

For the 2d. Figure

4	300	3
2	30	9
		27

30	300
2	4
60	1200
9	3
540	3600

3600
540
27
4167

4320
4487 168 (23
8
4167

For the third figure of the root, I put down the two numbers 300, and 30 as before, and against 30 at the left hand I put down 23 the root already found, and against 300 the square thereof, which is 529, then multiply 529 by 300, the product is 158700, I find this may be taken twice out of the remaining number of the Cube 320168, therefore I put 2 in the quotient for the third figure of the root, and likewise set 2 at the right hand of 300, and the square thereof which is 4 at the right hand of 30, and the Cube thereof which is 8, I put under 30. Then I multiply all the numbers in each row into one product, viz. 529 by 300, makes 158700 and

529	300	2
23	30	4
		8

529	
300	
158700	
2	
317400	

23
30 317400
690 2760
4 8
2760 320168

4310
12487168(232
320168

Proof.

232
232
464
696
464
53824
232
107648
161472
107648
12487168

that again by 2 makes 31700, which I set by it selfe, then I multiply 23 by 30, which makes 690, and that again by 4, makes 2760, which I set under the former Product. Lastly, because 8 hath no number with it, I set it down under the other two Products, and casting up the Sum of all three, they make 320168, which taken from the number ober the last prick, there rests nothing. So I conclude that 232 is the Cube root of the foresaid number 12487168.

For the proof thereof, multiply the said number 232 Cubically, as you see in the margent, viz. 232 by 232 makes 53824, and that again by 232, makes just 12487168 the number first proposed.

But when you have a number given to extract the Cube root, & the aforesaid given number, is not a right Cube number; whereby you cannot come to any perfect root thereof, but that there will remain some fraction or broken number after your said extraction; the manner to extract the root of a number, not Cubical, as most writers do affirm, is thus.

The difference betwixt the Cubick number of the root, and the Cubick number of a number more than the root by an unity, shall be the Denominator to the remainer, I also added thereto. As for Example.

Let 12 be a number given, which not being a right cube number, I would find the greatest root thereof: First, the greatest cubick number in 12 is 8, the cube root whereof being 2, I put in the quotient, and subtracting 8 the cube thereof from 12, there will rest 4, which 4 being ober, sheweth that 12 is no cubick number; therefore adding 1 to 4, makes 5, which I put for the Numerator: & to find the denominator thereto, I set down the cube of 2 the root found which is 8, and likewise 27 the cube of 3, which is a number more then the root by 1; then subtracting the one from the other, viz. 8 from 7, leaves 19 for the Denominator. By

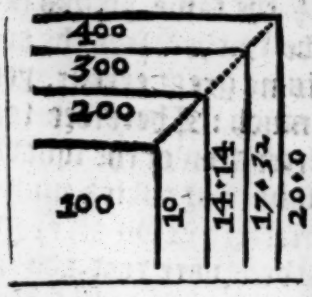
which

which reason the nearest cubick root of 12 is $2\frac{5}{19}$, which being reduced and multiplyed cubically makes $11\frac{4053}{6859}$, the same abbrevi-ated, makes 11, and very near $\frac{1}{2}$ and it should be 12, therefore the erreur is $\frac{3}{4}$ too little, which although in this is no great erreur, yet in a great sum, the erreur would be very much: Therefore for those which desire a more exact and perfect extraction of the square or cube root from numbers not being right square or cubick numbers. M. Record in his Whetstone of Wit, setteth down an exact way (but very tedious) which is thus. For the square root, adde to the given number so many times two ciphers, as you desire the nearness of the root: And for the cubick root so many times 3 ciphers, as you desire the exactness of the root thereof: and under the said ciphers put pricks in such order as before is taught, and then mark how many pricks there is over and beside the pricks of the given number, and then extract the root from all those ciphers, in such order as you did before: For if there be one more, the roots shall be tenths, and the remainer, parts of $\frac{1}{10}$, if there be two points or pricks over more than the given number, then the root shall be hundreths, and the remainer, parts of $\frac{1}{100}$: if three pricks be over, the root shal be thousands, and the remainer parts of $\frac{1}{1000}$, and so you may come to a very near root, but not to any exact or perfect root, unless the given number be a right square or cubical number. Thus the square root of 18 may be found to be $4,\frac{24164062712}{10000000000}$; and the cube root of 12 will be found $2\frac{18943}{10000}$. This way is very exact, though somewhat troublesom but if you have a Table of Logarithms, which are now very common, (though not known in the time of this Author) the work is most easie. For half the number of any Logarithm is the Logarithm of the square root; and the third part of the number of any Logarithm, is the Logarithme of the cube root. So that you need only divide any Logarithme by 2, and you have the Logarithme of the square root, or by 3, and so you shall have the Logarithme of the cube root; which will shew you the cube and square roots in decimal parts very exactly.

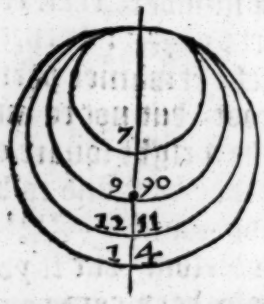
Of the Use of the Square and Square Roots.

FIrst to make a Square, two, three, four, or any number of time bigger than another Square. Square the side thereof, and so

finde the content, which being doubled, trebled or quadrupled, and the root thereof extracted, shews the side of the square desired. Thus the side of a square being 10, the content is 100, the double hereof being 200, the side or root thereof will be found to be 14.14 parts The treble thereof being 300, the side or root thereof is 17.32 parts. The quadruple thereof being 400, the root thereof is 20. Which though it be but double to the first side or root 10, yet is 4 times the quantitie.



Secondly, as you do by the square, so you may doe for the Circle, knowing either the diameter, Semidiameter, or the circumference thereof, square it that is multiply it in it selfe, and then double, or treble, or quadruple ỳ number, & extract the square root thereof, so you shall have the diameter, or circumference of a circle that shall be 2 3 or 4 times bigger then the other. Thus the diameter of a circle being 7 Inches, the square thereof is 49, the double hereof is 98, the root thereof is 9. 90 parts fere, the treble thereof, or 49 by 3, is 147. and the root of that 12. 11 parts. The quadruple thereof, is 196, and the root thereof 14 which is double to the first diameter, and four times in value. And so if the Compals of a Cable be 7 Inches, one of 14 inches compass shall fathom for fathom: weigh foure times the weight. And so likewise if it be but 3 inches and an half in compass, which is but the half of 7 inches, it shall be but a quarter of the weight and strength: And so you may finde the weight and strength of any cable or hawser, by squaring the Compals thereof, and comparing it with another, whose weight and compass is known.



Thirdly, If you add two squares of any two numbers together, they will amount to the square of the sloape line which shall make them stand at right angles. Thus in any plaine right angled triangle, having the perpendicular, & the Base, you may find the

the sloape line. For Example, take these three small numbers 3, 4, and 5 (which are eminently known to make a right angled triangle, being found out long since by Pythagorus) having the two sides 3, and 4, you may finde the sloap side to be 5. For the Square of 3 is 9, and the square of 4 is 16, these two square numbers added together, makes 25, the square root whereof is 5, which is the length of the sloap side. And so it will be in any other triangle, proportionably to the sides thereof. And thus by the Longitude and Latitude of two places, you may find their distance, as is shewed before, page 109 or 110.

9
16
25
5

Fourthly, having the sloape line of such a triangle and one of the other sides, to find the Base, work thus. Square the sloape line, and likewise square the other side, and substract the square of the side from the square of the sloap line, and there will remaine the square of the other side. Thus For Example, the sloape line being 5, the square thereof is 25; And one of the sides being 3, the square thereof is 9; which substracted from 25; there remaines 16, which is the square of 4, which is the other side. And so likewise if you substract 16, which is the square of the other side, from 25 the square of the sloape side, there will remain 9, which is the square of 3, for the other side. This you may make good use of in Navigation, and Surveying, to finde out perpendiculars and sides of triangles.

25
9
16
4

25
16
9
3

Lastly, As you may thus find the sides of this right angled triangle, so with a little more trouble you may finde out the sides of any triangle; for the whole Canon of Sines, Tangents and Secants are made after this manner. But this may suffice for a taste of the use of the square numbers and their Roots.

The

The use of Cubick numbers and their roots.

THe use thereof is much like to the use of the squares, only what they performe in the superficies of any figure, these performe in the solid body thereof.

First therefore, if you would double the Cube, or make one Cubicall or solid body, equall to any two lesser ones, take the side of each Cube, and multiply it cubically in it selfe, then add them both together and extract the cubick root from them, and that shall be the side of the cube equal to them both. Thus if you have a cube that is 4 inches or feet on each side, and would have a cube made as big againe. Multiply the side 4 in it selfe it makes 16: and that multiplyed againe by 4 makes 64: the double whereof is 128, and the cubick root thereof is neer 5 somewhat above it, for the cube of 5, is 125, and more exactly the cube root of 128, is 5, 0'465 parts, and such a cube, shall be double to a cube of 4 inches. But if you double 4 side of the cube, & so make it 8 every way, such a cube shall be 8 times bigger than the number of 4; for 8 times 8 is 64, and 8 times 64, is 512, which is the content of the cube of 8.

Secondly, as it falls out thus in square cubical bodies, so it is likewise in round bullets, or solid globes, so that knowing the weight of any bullet, whose diameter is known, you may know the weight of another bullet, by its diameter. Thus a bullet of Iron of 4 inches diameter, weighs nine pounds: and a bullet of 5 inches or a little more shall weigh 18 pound, which is double the weight, and a bullet of 8 inches diameter shall weigh 72 pounds, that is 8 times the weight. And so by cubing the diameter of any bullet, you may finde the weight thereof. As the cube of 4 which is 64, to 9 pound weight; so the cube of 5, which is 125, to 17 pound, 58 parts. And so by the weight you may finde the diameter.

To conclude, As it is in round and square solid bodies, so it is in all other solid bodies, so that knowing the Mold and burden of one ship, you may build another thereby on the same mold of what burden you please, either more or less, after this manner. Measure the length of the Keel, the length of the mid-ship beame

the

the depth in the hold, and such like parts as make the shape and mould of the ship, and multiply them cubically, part by part, and so make each part proportionable. For Example. Suppose a ship of 100 Tunnes being thus measured, was found to be 44 foot long by the keel, 20 foote broad upon the midship beame, 9 foot deep in the hold, and did rack it with the Steem forwards 13 feet, and the sterne post did rack 7 foot offwards: and you would desire to make another ship of the same mould, whose burden should be double to it, that is 200 tunnes. Multiply each of these numbers Cubically, as first the length of the keel being 44 foot, multiplyed Cubically, viz. 44 by 44 makes 1936, and that again by 44 makes 85184 which number must be doubled, because the ship is to be double the burden of the other, so it makes 170368, then you must extract the cube root of this number, & it wil yield 55 feet, & 437 thousand parts fere of a foot, which is 5 inches and almost a quarter of an inch. And so you must do by al the other dimensions of the ship to find the length of every of them, and so make them all proportionable to each other.

Or else you may in such a case as this, when you have many lengths to find, having found out one of them as before by the cube you may find the other by the rule of proportion. Thus having found the length of the keel to be 55 feet 437 parts, and you would find the length of the midship beame proportionable to this which in the ship of 100 tunnes was 20 feet. Say,

		foot	feet. parts
		feet parts	
For the mid-ship beam 20 foot.	*As* 44, *to* 55.437: *so*	20, *to*	25.199
For the depth in the hold, 9 foot.	*As* 44, *to* 55.437: *so*	9, *to*	11.339
For the racking of ye stem 13 foot.	*As* 44, *to* 55.437: *so*	13, *to*	16.379
For the stern post which did rack 7 foot offward	*As* 44, *to* 55.437: *so*	7, *to*	8.819

Or else having found the proportion of one cube to another, you may worke by that. Thus.

The Cube of 1 being	1,000	The Cube of 5 or *quintup.*	1.710
The Cube of 2 or the *double*	1.260	The Cube of 6 or *sextuple*	1.817
The Cube of 3 or *triple*	1.442	The Cube of 7 or *septuple*	1.913
The Cube of 4 or *quadrupl.*	1.557	The Cube of 8 or *octuple*	2.000

And

And thus the foresaid supposition, being 44 feet by the Keel, for a Ship of 100 Tuns, to finde the length of the Keel for a Ship of 200, 300, &c. Tuns,

	Tuns		Feet		Feet.parts	
For a Ship of	200.	As 1.000, to	44:	so 1.260, to	55.440	The length of the Keel
	300.	As 1.000, to	44:	so 1.442, to	63.448	
	400.	As 1.000, to	44:	so 1.587, to	69.828	
	500.	As 1.000, to	44:	so 1.710, to	75.240	
	600.	As 1.000, to	44:	so 1.817, to	79.948	
	700.	As 1.000, to	44:	so 1.913, to	84.172	
	800.	As 1.000, to	44:	so 2.000, to	88.000	

And out of these few propositions, you may draw many more. But this is enough at present, to shew the use of the Square and Cube Roots.

A Declaration of the Tables of longitude & latitude of places following.

THe Tables hereafter following shewing the longitude and latitude of places, viz. of Kingdomes, Provinces, Cities, Isles Capes Bays, Rivers and Mountains, especially the most principal of them in the whole world, are gathered from the latest Descriptions, Maps, and Charts, as well universal as particular: who albeit they differ greatly in longitude, yet in latitude most of them agree, and also having a respect to the beginning of each of their several longitudes, they come all to a neer agreement. For some beginning their longitude at the Westermost part of Affrica, makes the longitude of London to be about 10 degrees 20 min. Others beginning at the Canary Islands, makes the longitude of London 18 degrees. Others more Westward make it 19 degrees 30 min And Jodocus Hondius beginning the Meridian at the Isle Pico, one of the Azores, makes London to be in longitude 27 degrees 40 minutes. But I following Mr. Emery Mullineux, according to his great Globes, do account the longitude from the Westermost parts of St. Michaels, another Isle of the Azores, the midst of which Isle is 50 minutes in longitude, and from the Westermost part thereof; the longitude of London is 25 deg. 40 m. which in effect is not much different from any of the others. Note, that the longitude is counted from the Meridian, passing over the aforesaid place eastwards, into a continual progression to the end of 360, which is the whole circumference of the world. Latitude is counted from the equinoctial to the end of 90 deg. on each side thereof. And where the letter S is after any number, it shews the place to have so many deg. and min. of South latitude; all the rest having no letter adjoyning, have North latitude; the whole being set in Alphabetical order for the readier finding of any place therein contained. And where the longitude and latitude of any Kingdome is set down, noted with this syllable Reg. it expresseth the middle thereof.

A Table of the Longitude and Latitude of all the Notable places of the World, newly corrected and Inlarged by Mr. T. *Stern* Globe maker.

A	Longit.		Latitude		
A Cupulco	265	00	19	00	
A Acartii an Isl.	329	01	52	01	
A Azores an Isl.	357	01	39	01	
Achaguas	101	30	05	30	S
Achin	132	30	34	40	
Aden	81	12	50	01	S
Adia	50	11	25	01	S
Adu	105	41	05	41	
Ægypt	64	03	30	01	
Africa Reg.	40	01	10	01	
Agonata	162	21	38	01	
Agragam	144	29	08	21	S
Aguada ſegura	253	29	24	01	
Aqua la de pozos	245	20	28	00	
Alina a Mountain	98	41	54	20	
Alacranes	283	05	22	01	
Alagoa	58	41	29	41	S
Albion nova	235	01	50	00	
Albiron	109	29	25	29	
Alboram	25	29	35	29	
Albrough	26	25	52	20	
Alepo	72	29	38	01	
Alcada	23	04	40	29	
Alexandria	65	01	31	21	
Alexandria	73	11	36	21	
Algaziu	16	00	29	01	
Algiero	33	01	35	21	
Algueſcet	63	41	26	51	
Alicante	28	41	39	01	
Alicoa	76	30	13	21	S
Alicur	44	21	38	29	
Alima	108	51	31	01	

A	Longit.		Latitude		
Alleluja	70	21	10	01	
Almedina	34	01	33	41	
Alpes a mountain	41	29	47	29	
Alſigubas	147	11	38	41	
Amazen	45	29	12	41	
Amazons Reg.	323	01	13	01	
Las Amazona	312	29	12	29	S
Ammon	59	41	27	11	
Amſterdam	33	01	51	29	
Averie a *Mount*	116	00	54	09	
Ancona	63	11	01	11	
Ancona	43	29	43	51	
Amboina	161	54	03	20	
Abona	164	30	06	10	S
Amiona	75	20	12	40	S
Andernopoly	58	11	44	41	
St Andre	170	29	12	01	
St. Andre	22	11	56	21	
St. Andreas	62	11	61	11	
Las a Negadas	296	00	50	01	S
Angier	24	41	47	35	
Angleſey	19	51	54	00	
Angl a Reg.	23	00	53	00	
Angoleſme	27	01	46	00	
Antiochia	300	05	06	40	
Antipara	74	02	25	20	S
Antwerpen	31	20	50	30	
Arabia Felix	83	00	21	00	
Arabia *Deſert*	77	00	30	00	
Argier	32	50	35	40	
Armenia Reg.	76	00	41	00	
Arnaltus a mount	35	00	11	30	S
Aſcenſion	353	20	18	50	

A B	Longit.		Latitude		
La Aſcenſion	15	30	08	00	S
Aſſyria Reg.	85	00	36	00	
Athens	56	10	40	00	
Avero	17	30	42	10	
Auguſtine	293	00	29	50	
Ausburgh	38	40	48	30	
Azur a mountain	59	00	22	40	
Amiens.	29	30	49	40	
B					
BAntam	140	00	05	40	S
Babylon	82	20	33	50	
Babel mandel	80	00	12	50	
Bachu	88	50	42	00	
Bactriana Reg.	115	00	38	30	
Bagaſus a lake	77	10	50	40	
Baharaman Ile bays	87	20	27	30	
Bay Anegada	319	50	40	20	S
Bay de baxos ane-	321	30	39	50	S
Bianza (gados	149	25	03	00	S
Batavia	123	00	03	20	S
Bay a Dalagoa	56	10	32	10	S
Bay de Fumos	140	20	36	00	
Bay de St. Migel	39	30	08	40	
Bay de Oceſionora	312	30	41	00	
Bay de pinos	233	00	40	30	
Bay Langos	18	00	37	30	
Bacalaio	335	04	48	28	
Bayona	17	20	42	10	
Bayone	25	30	44	00	
Balſera	82	04	31	10	
Bamberg	39	15	50	10	
Bandu	173	30	33	00	
Bax de los pergos	345	30	20	00	S
Barbados	328	20	12	40	
La Barbada	192	50	01	50	S
Barlingas	16	20	39	30	
Barnagoſſos Reg.	70	00	13	00	

B	Longit.		Latitude		
S. Bartholome	194	30	14	00	
Bermoudas	316	10	32	30	
Baſel	37	10	47	50	
Beciaſa	65	00	10	30	
Beil	76	15	27	10	
Belef	69	00	51	40	
Beliſſe	21	30	47	00	
Belt	51	40	50	00	
Bengala Reg.	126	00	26	30	
Benichao	136	00	03	50	
Benin Reg.	41	00	07	40	
Bepirus a mount	143	00	34	00	
Bepirus a River	138	20	34	00	
Berga	40	10	62	50	
Bergen	30	30	60	50	
Barwick	22	50	55	50	
Bethle	138	50	25	40	
Baiſer Reg.	50	00	04	00	
Braligrod	58	20	47	30	
Bilbao	23	30	43	00	
Blaskey	12	00	51	40	
Blaves	31	10	42	00	
Blavet	21	15	47	50	
Bloe	5	30	67	00	
Borneo	145	30	05	10	
Borntholm	40	50	55	30	
Bovenbergen	34	20	56	30	
Brandenberg	42	30	52	50	
Braſil	5	10	51	20	
Braſilia Reg.	345	00	10	00	S
Brava	74	30	00	30	
Breſt	20	00	43	30	
Brunge	25	36	43	50	
Bruges	29	00	45	30	
Buda	48	00	47	20	
Burdiaux	26	00	45	10	
Briſtowe	22	50	51	35	
Brachipult point in Wales	21	25	53	00	

B C	Longit.		Latitude		
Bachapto	31	00	59	50	
Bruſſels	30	50	51	00	
Barcelona	28	15	41	10	
Burlings.	16	00	39	38	
C					
Capes.					
CAp S. Francis	335	00	48	05	
Cap Raſo	334	40	46	28	
Cap *Maſſiſaco*	14	00	43	32	
Cap de las penes	21	00	43	35	
Cap de Alinde	346	50	01	00	S
Cap de Amber	83	30	12	00	S
Cap de S. *Anton*	289	15	22	50	
Cap Cleare	14	10	51	09	
Cap de S. *Antoni*	74	30	17	00	S
Cap de S. Auguſt.	162	00	06	30	
Cap de S. *Auguſt.*	354	00	08	30	S
Cap baxo	328	00	04	20	
Cap de las baxas	19	41	15	29	
Cap Bedford	320	01	65	29	
Cap blanco	273	19	25	21	S
Cap blanco	281	19	10	29	
Cap blanco	331	21	04	26	
Cap blanco	334	21	52	01	
Cap blanco	259	41	02	21	S
Cap blanco	151	01	22	41	
Cap brava	275	01	27	29	
Cap de Breton	331	01	45	41	
Cap cameron	287	21	25	41	
Cap comerin	115	15	07	30	
Cap Cantin	17	01	32	11	
Cap de S. Kathar.	41	01	01	01	S
Cap Cod	317	00	41	00	
Cap de cro	31	29	42	11	
Cap de croce	65	21	48	21	
Cap Deſierto	381	21	29	21	
Cap Deſperance	324	29	51	01	

C	Longit.		Latitude		
Cap S. Domingo	315	21	46	41	S
Cap falſo	49	31	34	40	S
Cap feare	305	11	32	29	
Cap felix	84	29	14	11	
Cap finis terre	16	01	43	11	
Cap Florida	293	21	25	29	
Cap formoſo	28	01	05	01	
Cap froward	302	39	53	21	
Cap de gato	26	39	36	51	S
Cap de S. Helena	326	11	36	11	S
Cap de ſantiago	309	01	37	29	
Cap S. John	62	29	67	29	
Cap de Krin	13	01	53	41	
Cap de S. Maria	77	29	24	01	S
Cap de S. Maria	82	52	15	51	S
Cap de *Maio*	327	11	35	11	S
Cap de S. Maria	9	41	21	41	
Cap de la *Mola*	36	51	06	29	
Cap de Nombre de Jeſus	308	11	53	01	S
Cap ortegal	18	29	44	11	
Cap de palmas	348	11	01	19	
Cap de S. Paul	32	00	05	50	
Cap de peſcadores	277	40	18	00	
Cap del plate	352	50	05	00	S
Cap primero	42	30	02	20	S
Cap de 3 points	28	30	05	00	
Cap de puntas	315	20	10	40	
Cap Daduillias	42	01	34	30	
Cap de Razo	334	30	46	30	
Cap ſalida	74	00	26	10	S
Cap deſpig'el	353	20	07	20	S
Cap de ſtavola	12	20	54	00	
Cap Torriga	11	30	18	20	
Cap la vela	305	10	11	50	
Cap S. Vincent	302	20	53	40	S
Cap de Virgin *M.*	308	00	52	10	S
Cap de Vittoria	297	30	52	00	S
Cap paſſaro	46	29	36	51	

C	Longit.		Latitude		
Cap Rasalgate	96	21	22	21	
Cap raso	317	40	08	00	
Cap roxent	16	29	38	50	
Cap roxo	11	01	12	00	
Cap of good hope	50	30	35	40	S
Cap del spirito san.	161	11	13	11	
Cap S. Vincent	17	00	37	00	
Cap Verd	9	51	14	20	
Cap de bona vesta	334	21	49	11	
Cap Walsingham	321	01	63	41	
Campon Reg.	136	01	47	00	
Cairo	67	29	30	00	
Calamita	67	41	48	10	
Caldy	20	01	51	40	
Calecut	112	41	10	29	
Calice in France	29	10	50	40	
Calibia Reg.	42	10	36	20	
California	245	00	30	00	
Camanor	300	20	16	30	S
Cambaba	150	00	08	10	S
Cambaya	110	00	22	00	
Camboya Reg.	141	20	11	40	
Capispa	304	50	34	00	S
Casma a River	121	40	61	00	
Castrum Portugal	57	10	20	20	S
Cazan	85	20	56	30	
Chaga	56	00	06	20	S
Chialo	56	20	07	00	S
Chilimazata	294	30	06	30	S
Chio	58	30	40	30	
Chiguisamba	305	30	17	00	S
Coale	55	00	21	30	
Coila	48	20	03	10	S
Cora	85	10	19	20	
Coronades	296	30	45	00	S
Corpo santo	84	10	07	30	S
Cumana	313	30	07	00	
Cusco Reg.	297	20	13	30	S
Cales in Spain	20	50	36	10	

C	Longit.		Latitude		
Cambalu	161	11	51	40	
Canada	305	11	50	21	
Canaria Grand	9	29	27	21	S
Canda	59	29	35	21	
Caribes	316	11	07	00	
Cartagena	300	01	20	11	
Cartagena	28	21	38	20	
Cartago	299	29	03	11	
Caesna Reg.	38	21	17	11	
Casser Reg.	132	01	47	01	
Cataio Reg.	150	01	53	01	
Catnes	22	09	58	29	
Carwicke	41	11	69	11	
Chester in England	21	29	53	51	
Chichester	24	11	51	00	
Chidlies cape	326	41	67	29	S
Chily Reg.	305	00	30	01	
Chirman Reg.	96	00	26	29	
Cirena	53	29	32	00	
Cypres	68	04	37	30	
Clearemount	30	55	45	51	
Cocas a Mountain	79	00	47	29	
Chohin	114	00	09	14	S
Callao Reg.	310	00	16	00	
Colmogory	02	41	63	41	
Colne	34	00	51	41	
Commania Reg.	86	00	51	00	
Congu	147	21	49	11	
Coninxberg	49	11	55	29	
Constantinople	61	01	44	40	
Copen hage	38	29	55	51	
Corasau Reg.	108	01	37	00	
Corke in Ireland	15	41	51	41	
Corfu an Iland	22	00	39	19	
Corinth	54	21	39	00	
Corsica	38	11	42	00	
Cotam Reg.	230	00	51	00	
Cracow	48	29	50	00	
Cuba	196	00	31	41	

C D E	Longit.		Latitude	
Earl of Cumberlands Isles	316	00	63	21
Cusitan Reg.	87	00	32	00
Conough	15	35	53	45
Cambridge	25	50	52	14
D				
Dangali Reg.	78	00	11	00
Diu	107	03	20	42
Damon	108	08	19	20
Dabol	109	06	17	45
Dawina	74	30	62	10
Dager Oort	48	41	39	41
Dolacia	77	00	14	21
Damascus	74	29	35	00
Danzicke	46	00	55	00
L. Darcies Isle	327	51	68	21
Derwinda	47	51	57	26
Deventer	33	25	51	51
Diep	28	41	49	29
Dires Cape	321	29	64	51
Dominica	319	41	14	00
Don a River	75	00	53	21
Donecz a River	71	00	51	00
Dorow	58	00	51	29
Dovor	28	11	51	00
Dublin	16	41	53	11
Dumaran	150	00	08	41
Duy	34	29	59	21
Duyhe	56	29	50	29
Davis straights	324	01	64	00
Darby	24	05	52	55
Dunkirk	29	10	51	12
E				
EBaida	60	01	25	29
Edingborough	22	01	55	51

E F	Longit.		Latitude	
Ely	25	40	52	40
Elior	26	20	10	10
Queen Elizabeths Foreland	337	00	61	30
Embden	34	10	53	10
Ens	43	00	48	30
Ens	74	10	37	30
Ephesus	60	30	39	40
Ergas	86	00	38	00
Euboya	56	13	41	00
Euphrates a River	76	40	40	00
Europa Reg.	55	00	51	00
Exeter	22	10	51	05
Enchuisen	31	40	52	54
F				
FAlsterhood	40	00	56	00
Famagosta	69	20	37	30
Farrollones	294	20	11	40 S
Fargana	114	40	46	00
Farre	16	20	61	30
Cape fatache	86	50	15	40
Faso	75	50	45	40
Farnasa	38	10	30	10
Fernandobuck	351	40	09	20 S
Fees Reg.	21	50	32	50
Fierro	6	20	26	30
Finmark	47	00	69	30
Flamborough head	25	20	54	00
Flensburgh	36	40	55	00
Flecorie	32	00	58	00
Flye	32	00	53	33
Florence	41	10	43	40
Flores Ilsland	353	40	39	20
Florida Reg.	292	00	31	00
Flocen	38	40	66	30
La Formanos	310	30	40	40
Formentera	31	10	38	50

F G	Longit.		Latitude	
Forteventura	11	00	28	00
Foyle	15	50	55	30
Frailes	314	30	11	20
Franckfort	36	30	50	00
Frisland	351	30	62	00
Forbishers straic	331	20	64	00
A furious Overfal	322	30	60	00
Farre Ilands	17	00	62	10
Farnil Ile	24	45	60	00
Ferando	164	00	32	35
G				
GAgo Reg,	25	00	08	35
Gilathia	37	20	37	00
Gambra a Ri.	12	00	13	10
Gant	30	20	50	40
Garamantica	51	30	16	00
Garneley	82	20	49	40
Gaza	70	50	33	10
Gamba	64	40	17	30 S
Gargiza	62	40	12	00 S
Gemenacota	118	40	06	00
Geneva	33	40	46	20
Genua	37	50	45	00
Genua	15	20	16	00
Gerguth Reg.	153	00	57	00
Germanarco	40	00	51	00
Getselvin	24	30	32	20
Gomera	09	30	27	00
Ghir a River	25	30	22	00
Giamber	18	01	33	41
Gilberts sound	326	51	67	01
Giras a River	41	21	20	11
Galloway	15	49	53	15
Goa	102	21	15	14
Glosgow	29	00	57	00
Golfo de bengala	125	00	15	00
Golfo de S. Helen	48	41	33	29 S

G H	Longit.		Latitude	
Golfo de la India	44	21	03	14 S
Golfo de los negro	350	30	02	00 S
Golfo del Rey	40	41	05	30
Golfo de todos santos	345	30	01	41 S
Golfo de S. Anton.	46	20	26	00
Golfo frio	45	30	20	00
Goteland	45	21	57	30
Gozo	58	20	34	41
Granada	318	20	11	00
Granata	23	30	38	00
Grecia Reg.	54	00	40	00
Gratiosa	357	30	39	02
Groninghen	32	11	53	00
Groenland	345	00	75	00
Groy	21	00	47	21
Guinea nova	180	00	05	00 S
Guinea Reg.	18	00	09	00
Gunagona	67	30	06	00
Gibraltar straight	21	30	36	00
Greenland	50	00	77	00
H				
HAles Island	337	30	63	00
Haliber	78	41	20	01
Halicz	52	51	48	41
Hamborough	37	11	53	21
Hartlepool	24	00	55	21
Harwich	27	29	52	00
Havana	292	11	23	00
Hebrides	15	20	58	00
Heydelberg	36	00	49	00
Helst	23	29	46	29
Heisshant	19	29	48	41
Heptapolis	324	29	25	21
Hercules Pillers	69	21	32	11
Hellichland	33	51	66	00
Hercania Reg.	100	00	40	00

H I	Longit		Laticude		
Hiſpania Reg.	25	00	40	00	
Nova Hiſpania	280	00	13	29	
Hiſpaniola	306	00	18	29	
Holindal	36	11	61	01	
Honts Oort	48	30	59	01	
Horne	12	10	66	10	
Hull	25	21	53	41	
Hungaria	50	00	48	01	
Hidaſpes a River	124	00	33	21	
Hipaſis a River	124	00	33	01	
Helin head	15	00	55	15	
Hereford	22	38	52	12	
Heel of Dantzick	46	11	55	40	
I					
Jambick	121	30	01	15	S
Jacatra	140	00	06	00	S
Jamaica	298	30	17	00	
Jaſques in Perſia	94	00	25	40	
Japan	169	00	38	00	
Jarſey Iland	23	00	49	20	
Java major	140	00	09	00	S
Java minor	151	00	08	00	S
Jazin	77	30	20	30	
Japara	141	20	07	40	S
Jericho	73	01	33	00	
Jeruſalem	72	21	33	00	
Iiemens a River	105	00	27	00	
Imaus a Mountain	128	00	39	00	
India Orientàl	135	00	26	00	
Indus a River	115	29	26	00	
Inſpurgh Iſlands	40	41	47	50	
The three Iſlands	169	21	40	00	S
Iſle de Avis	310	30	11	09	
Iſle de Avis	173	50	04	30	
Iſle de baſtinado	293	30	10	30	
Iſle Brava	1	20	14	20	

I	Longit.		Latitude		
Iſlas de corales	194	40	09	50	
Iſle Deſierto	178	00	31	01	
Iſle del fuego	2	30	14	21	
Iſle de los fuegos	181	29	27	40	
Iſle de los Galopegos majores	281	10	04	00	
Iſle de los Galopego minores	277	30	01	10	
Iſle de Hombres blancos	169	20	05	41	S
Iſle de S. Jago	158	20	08	00	S
Iſle S. Ivan	164	30	06	00	
Iſle de los Ladrones	177	31	15	11	S
Iſle de los Lobos	3	7	41	40	21
Iſle de S. Matia	296	29	37	02	
Iſle de Martin vaz	11	21	21	01	S
Iſle de Mayo	4	29	13	29	
Iſle de S. Michael	0	00	38	25	
Iſle de Negros	155	29	10	29	S
Iſland of Fowles	334	00	50	00	
Iſle de Orleance	312	00	50	29	
Iſle de pajaros	314	00	12	41	
Iſle de Palmas	163	21	06	00	
Iſle de Paxaros	198	51	08	51	
Iſle de Paxaros	234	21	28	00	
Iſle de Pearles	193	10	07	00	
Iſle de Pinos	192	21	21	29	
Iſle de Rees	162	00	25	20	
Iſle of Salt	5	00	16	29	
Salomon Iſland	204	40	10	00	S
Iſle Solis	347	00	10	29	
Iſle S. Thomæ	38	00	00	00	
Iſle S. Thomas	152	00	20	11	
Iſle de Verde	353	51	45	29	
Iſle S. Vincent	175	50	08	00	
Iſle S. Vincent	73	21	20	29	S
Iſle de S. Catalina	234	10	27	30	S
Iſle de S. Cedros	240	30	29	50	S

I K L	Longit.		Latitude		
Isle de farnan lato	354	20	02	20	S
Isle de lima	295	10	22	00	S
Isle Secas	46	20	29	30	S
Isle de Tristan de Acunia	26	30	36	00	S
Joam	135	00	07	29	
Jolofo	24	29	06	00	
Ipswich	27	12	52	22	
Joppe	71	21	34	00	
Isebella	305	21	18	51	
Island	08	00	66	00	
Italy Reg.	042	29	43	00	
Ireland	16	00	53	29	
Jucatan Reg.	283	00	18	00	
Jugor	138	00	07	50	
Juica	31	21	39	30	
Julibella	61	00	01	30	
K					
KAlmuchy in Tartaria	95	00	51	00	
Karakithath Reg.	119	00	51	00	
Kasakky Tartaria	103	00	51	00	
Kithais Reg.	110	00	57	00	
Kithay a Lake	123	31	53	00	
Kolay	54	51	69	00	
Kolen'g	04	11	65	10	
Kosar a River	96	40	49	00	
Kinsale	19	30	56	45	
Kinsaile	15	03	52	35	
L					
LAcierna	24	50	39	30	
Ladena	53	30	41	31	
Ladoga	62	11	61	40	
Lago de los coronadus	295	01	44	00	S
Lampesa	36	21	33	00	

I	Longit.		Latitude		
Lancerota	11	41	29	30	
Lanow	51	11	52	20	
Laredo	22	51	43	00	
Larisa	70	00	33	00	
Larta	53	00	46	00	
Lake de Gouleme	306	40	48	00	
Lacus armibus	131	00	60	10	
Lacus falsus	137	40	47	30	
Leon	23	11	42	15	
Leon	283	41	11	21	
Leopolis	52	51	49	02	
Lepin	98	00	58	41	
Leguio Major	165	00	28	00	
Leguio Minor	158	41	22	00	
Lerida	28	21	41	30	
Lester poynt	335	00	62	00	
Lima	296	41	23	30	S
Limonia	72	11	44	20	
Lymosa	43	29	34	50	
Lions	32	41	45	40	
Liorne or Ligorn	40	21	43	30	
Lisbon	17	29	39	11	
Lyzard	18	30	50	10	
London	25	50	51	40	
London coast	316	11	72	00	
Lepeso	74	01	49	41	
Loyre a River	24	14	47	41	
Longsound	34	30	58	55	
Lubec	38	02	53	51	
Lucka	42	11	52	00	
Lucky	64	00	58	21	
L. *Lumleys* Inlet	320	00	61	00	
Luna a *Mountain*	60	00	16	00	
Lundy	19	02	51	00	
Lutzke	54	00	50	21	
Luzon an Iland	156	00	17	03	
Lybia	33	00	23	30	
Lin	29	25	52	48	
Lincoln	25	25	53	22	

M	Longit.	Latitude
Aboga	60 41	13 30 S
Machian	106 41	00 29
Machoenta	93 51	33 41
Macin Island	93 30	75 30
Macyra an Island	93 00	19 40
Madera Islands	18 11	31 29
Meotis palus	71 50	39 20
Magadoxa	78 00	05 11
Magalo	71 20	09 39 S
Marda	2 40	46 40
Magellan straights	305 00	53 25 S
Majorca Island	1 30	39 00
Malibrigo	178 51	25 00
Malaca	137 00	03 30
Malaga	23 51	37 21
Maldivaran Island	113 00	03 00
Malorca	31 31	30 00
Malta an Island	46 00	35 [illegible]
Man an Island	19 00	54 51
Mosambique	79 00	15 32
Magador	16 20	30 50
Mamora	155 06	00 30
Mombasa	72 00	04 50 S
Mangesia	61 19	41 29
Mangichina	150 00	37 00
Manica	62 51	23 29 S
Manicorga Reg.	46 00	05 00
Maniola Island	140 30	03 30 S
Merchant Isle	330 00	68 21
Mare de Bachuor	92 00	45 00
the Caspean sea		
Mare Congelatum	345 00	64 00
Mare de India	120 00	10 00 S
Mare major	68 00	46 00
Mare mediterran.	59 00	35 00
Mare rubrum	75 00	20 00
Mare vermejo	55 00	26 00
Mare deltzuo	270 00	15 00

M	Longit.	Latitude
Ma garita	314 11	10 50
Marigalante	320 00	15 00
Ma mos	306 21	40 40
Ma occo	20 00	30 19
Marcellis	33 51	43 40
Masalig	43 29	30 20
Milford haven	20 25	51 48
Masiagan	30 01	35 20
Mazaker	167 00	33 00
Madagascer	77 00	19 05 S
Marecapane	312 10	08 00
Meander a Mount.	152 00	31 30
Malestream	36 00	62 22
Meb	46 29	54 30
Medina ocly	23 29	41 10
Medina talnaby	37 00	27 20
Manilia	156 00	03 16
Medino	198 29	36 29
Middleburg	20 40	52 00
Meessen	41 00	52 10
Melinde Reg.	71 21	03 20 S
Melley Reg.	15 41	12 00
Melying	48 01	54 50
Menes	35 51	50 00
Mesher	85 29	52 50
Me opotamia	78 01	35 00
Messapa	45 52	37 50
Mecz	33 19	49 45
Mien Reg.	136 01	31 00
Mienskow	56 41	54 50
Millaine	38 29	06 10
Minorca Isle	31 26	40 00
Moldavia Reg.	55 00	46 00
Molines	30 21	46 49
Mollucca Islands	160 41	01 00
Memorancie	130 00	47 00
Mongul Reg.	160 00	61 30
Monte de Branid	42 11	30 15 S
Mount Erogoso	344 00	12 00 S

M N	Longit.		Latitude		
Mont negro	44	41	17	00	S
Mont raleigh	32	38	65	00	
Mont royal	301	00	45	40	
Moorea Reg.	54	30	38	00	
Morack	68	50	55	00	
Mosambique Reg.	70	20	14	45	S
Moscovia Reg.	80	00	59	00	
Moscow	70	00	55	45	
Mosia	84	30	35	00	
Mossul	84	00	34	55	
Mozena	24	20	34	30	
Moa	96	36	21	31	
Minas	165	00	46	20	
Meseneck	69	50	51	30	
Munster	35	00	52	10	
N					
Nabaiz	79	50	50	50	
Naiman Reg.	140	00	64	00	
Naynea	31	10	50	00	
Nantes	24	10	47	50	
Napoly	43	00	41	00	
Napoly	55	10	38	00	
Napthaly	73	00	34	30	
Narbona	30	20	43	20	
Nardenbourg	47	10	67	05	
Narve	56	10	60	00	
Narvare	26	40	41	35	
Naseph	110	30	43	00	
Natoria Reg.	66	00	41	00	
Nazareth	72	40	34	10	
Newcastle	23	10	55	20	
Newfound Land	334	20	46	30	
Nicaria	59	30	39	30	
Nicober an Island	130	30	06	40	
Nicomedia	63	30	44	20	
Nicopolis	56	30	45	00	
New England	315	00	43	00	
New Plimuth	315	00	41	37	
New Salem	315	10	42	35	

N O	Longit.		Latitude		
Nicflot	57	40	59	50	
Nilus a River	67	20	[illegible]	00	
Ninus	82	20	37	00	
Nisa	36	10	44	00	
Nissa	45	30	50	30	
Naze in Norway	31	00	58	05	
Noca a mountain	81	00	40	21	
Nolon	30	00	40	22	
Nombre de dyos	294	29	09	22	
Norumbega	315	41	43	41	
Norweigh	35	00	62	02	
Novograde	57	11	53	02	
Nowgod	65	29	52	41	
Nowgorod	62	51	60	29	
Nowgorod	80	02	55	21	
Nubia Reg.	57	02	13	00	
Nubia a River	57	02	15	41	
Norenberg	39	09	49	29	
Norwich	27	15	52	45	
O					
Oby a River	107	01	55	02	
Occa a river	77	29	55	41	
Olant	43	29	57	00	
Oleron	24	29	45	29	
Olone	24	29	47	00	
Omagua Reg.	310	00	09	00	S
Omba	54	11	66	51	
Onega a River	56	41	64	00	
Onegaburg	59	29	62	29	
Opawkow	69	10	53	30	
Orcades Isles	22	11	59	01	
Orellana	310	00	05	00	
Oriza Reg.	119	01	18	02	
Orleans	28	29	48	02	
Ormus Isle	91	20	28	40	
Orsa	59	51	54	21	
Orsa	41	21	61	39	
Ortona	44	29	42	40	
Ortonto	49	29	40	21	

O P	Longit.		Latitude		
Oxenford	24	00	52	00	
Oya Reg.	75	00	13	00	
Oſtend	29	29	51	29	
Orenge	30	35	43	35	
Orliance	27	52	47	42	
Old-ſound	31	56	51	25	
Orfordnes	28	00	52	15	
P					
Pagaſa	99	51	45	00	
Paſto	290	30	05	10	S
Palagoſa	47	29	43	00	
Palandura Iſland	108	00	11	00	
Palatia	60	51	39	21	
Palma Iſland	6	25	28	00	
Palona	105	10	02	00	S
Palmer	120	00	41	00	
Pambolona	24	29	42	41	
Panama	194	29	08	11	
Pantanalia	42	50	36	29	
Panuco	270	11	22	20	
Pavia	375	50	46	10	
Patrick purgatory	15	55	54	32	
Paris	29	02	48	29	
Parma	39	20	45	11	
Paſſan	41	50	48	41	
Paura	37	51	46	11	
Pazuaſu	155	29	45	51	
Pechora	65	51	67	00	
Pechora Caſtle	73	51	64	51	
Pegu	135	00	20	00	
Peim Reg.	132	00	51	29	
Perigo	323	11	47	21	
Pernow	53	29	58	41	
Peru Reg.	296	00	10	00	S
Peruſia	42	20	43	11	
Peſcara	34	29	30	11	
Phillipina Iſland	158	00	15	00	
Palimbam	142	40	07	30	
Pico	356	41	38	21	

P	Longit.		Latitude		
Piceora Reg.	317	00	10	00	S
Pigmei	148	41	32	02	
Plilimgu	144	21	40	02	
Pina	296	21	03	01	
Pinga	101	40	14	20	S
Port de los Leones	3	8	00	42	30
Piramides	173	11	10	21	
Piſa	40	29	43	41	
Pzan	73	00	51	29	
Plata	315	00	19	51	
Plimouth	21	11	50	51	
Poosko	48	11	52	41	
Plotsko	57	29	57	41	
Podolia Reg.	59	00	49	29	
Poyectiers	26	29	47	11	
Poldaved	20	05	47	51	
Polonia Reg.	53	01	50	00	
Bien Porta	177	21	02	00	S
Port de Canoas	239	21	36	41	
Port de Cavallos	283	00	14	21	
Port de la Concepti	45	41	04	21	S
Port Deſire	313	00	47	41	S
Port Famine	302	51	53	11	S
Port Fremo	44	00	04	00	S
Port Delgado	42	11	03	51	
Port de S. Miguel	240	29	35	02	
Port del Nigrillo	296	51	17	11	
Port a Poſt	17	30	41	15	
Port Sallido	186	41	03	00	S
Port Santo	10	00	32	29	
Port S. Vincent	337	21	23	51	S
Prage	41	29	50	00	
Preſlaw	49	40	51	11	
Preſlaw	49	41	49	45	
Portland	22	40	50	40	
Point Comfort	309	10	37	12	
Primsberg.	48	30	55	11	
Pruſia Reg.	50	00	54	06	
Ptolomais	66	41	9	40	

P Q R	Longit.		Latitude		
Punto de S. Hellen	290	11	02	41	S
Punto de S. Hellen	325	21	37	30	S
Punto de S. Lucas	152	29	23	29	
P. iuan	118	00	00	20	
Q					
Quanzu	157	29	44	10	
Quelen fu	158	29	36	01	
Quiantu	144	41	42	20	
Quiloa Reg.	69	51	08	51	S
Quinza	153	00	40	01	
Quito	293	11	00	01	
Quivira	233	00	42	00	
R					
Raguſi	40	29	41	00	
Rameſes	68	29	30	30	
Rane	352	41	63	00	
Ravenna	42	21	44	21	
Rhodes	61	41	37	11	
Rianrech	94	41	40	00	
Ribadeo	20	21	43	21	
Richman Iſle	317	30	48	34	
Riga	53	30	58	00	
Rems River	30	35	49	12	
Rio de Arboledas	329	00	01	41	S
Rio de S. Auguſt:	350	00	15	03	S
Rio de S. Barbara	326	41	34	01	S
Rio del Braſill ſnes	348	21	17	11	S
Rio de los camero-	42	00	05	25	
Rio de Camerones	315	00	44	29	S
Rio del campo	42	29	02	51	
Rio d' angla	42	30	01	40	
Rio de Canpo	298	40	33	10	
Rio dulce	316	29	52	00	
Rio de S. Dom'ngo	353	00	07	51	S
Rio del eſtremo	340	41	22	59	S
Rio de Flores	285	19	19	00	
Rio del gado	34	21	06	21	
Rio de Gigantes	278	30	9	00	
Rio grande	301	11	11	00	

R S	Longit.		Latitude		
Rio grande	314	29	44	00	
Rio del guato	284	29	9	29	
Rio de la Hacha	304	15	10	41	
Rio de S. Helena	348	41	10	29	S
S. Laurence River	318	51	53	00	
Rio de Manicong	48	21	10	00	S
Rio del Oro	10	21	22	29	
Rio de palmas	272	11	14	21	
Rio Panuco	271	51	22	29	
Rio de Perla	292	29	29	00	
Rio de la plata	326	29	36	02	S
Rio primero	327	41	55	00	
Rio ſancto	300	29	03	00	S
Rio de Spiritu ſan.	281	29	31	00	
The white River	308	11	51	21	S
Rypon	35	29	55	21	
Roan	27	41	48	51	
Rochel	25	29	46	41	
Romey	42	29	42	00	
Rooſewicke	40	21	54	00	
Roſtowe	72	11	57	00	
Ruſſia	57	29	59	29	
Rye	27	29	51	01	
Rio de ſenega	14	25	15	06	
S					
Sabarſa	154	51	45	00	
Sableſtan Reg.	114	00	34	00	
Sabron	84	51	45	11	
Saffe	16	10	32	10	
Sacndeber	174	41	35	51	
Sagatin	95	29	38	21	
Sala	89	41	48	00	
Salamanca	20	29	40	51	
Salaſta	72	41	41	51	
Salina	45	00	38	29	
Salle	20	10	33	30	
S. Sebaſtina	24	25	43	15	
Salsburge	42	00	48	21	
Salſtom	32	21	62	00	

S	Longi.		Latitude		
Salvado	321	21	05	00	
Samaria	72	21	33	40	
Sanderſons Tower	310	00	65	9	
Hope Sanderſon	316	21	72	41	
Sandry	162	51	53	00	
Sanſon	20	41	43	21	
S. Crux	334	21	43	29	
S. Chriſtophers	319	10	17	00	
S. Davids	20	00	52	00	
S Dominigo	307	11	17	51	
S. George	357	11	39	00	
S. Helena	14	30	16	00	S
Santiago	264	29	20	29	S
Santiago	298	11	32	11	
S. Jago	175	29	02	00	S
S. John de luz	25	11	43	21	
S. Lazaro	71	00	11	21	S
S. Lucar	21	21	37	11	
S. Lucia	01	01	17	00	
S. Malo	24	21	48	50	
S. Maria	82	29	17	00	S
S. Maria	240	41	34	21	
S. Maria	00	29	56	00	
S. Maries	89	01	44	29	
S. Maries of Naza.	66	30	16	29	
S. Martha	301	21	10	41	
S. Martin	321	11	51	00	
S. Martins Iſland	293	40	46	51	S
S. Mathews	21	11	01	51	S
S. Michel	60	50	65	29	
S. Michael	00	50	38	05	
S. Miguel	327	21	47	21	
S. Miguel	291	41	09	11	S
S. Miguel	268	00	24	00	
S. Miguel	249	00	32	51	
S. Nicolas	69	00	64	00	
S. Nicolas	323	21	53	41	
S. Nicolas	2	02	17	00	
S. Petro	64	29	01	29	

S	Longit.		Latitude		
S. Pole de lion	20	41	48	48	S
S. Simpſon	306	29	40	29	S
S. Vincent	0	29	17	29	S
S. Vincent	318	41	11	51	S
Sapom Iſland	107	11	00	29	S
Sarachi	84	29	44	11	S
Saragoſa	26	11	41	51	S
Sardinia	39	00	40	00	S
Satyrorum Iſland	174	11	46	30	S
Savatapoly	75	29	47	21	S
Searborough	24	51	54	51	S
Schotland	25	0	60	00	S
Scotland Reg.	20	00	57	00	S
Segidin	49	00	47	11	S
Seimes	19	29	48	21	S
Senega Reg.	13	00	24	00	S
Seneti Reg.	106	29	33	29	S
Siboliſher	83	41	56	20	S
Shahaskik	91	29	53	09	S
Shrewbury	22	35	52	40	S
Sierraleone	15	30	07	40	S
Scalholt	8	30	65	20	S
Sibier Reg.	96	20	59	30	S
Sicilia	45	00	37	30	S
Sidon	72	10	36	30	S
Siam	140	00	13	49	S
Sinai mountain	27	00	30	00	S
Sinus Mexico	280	00	26	00	S
Sinus Perſia	85	00	29	00	S
Sion	59	10	12	40	S
Sipanta	45	30	41	50	S
Sivil	18	00	37	45	S
Slaba	55	50	58	41	S
Slavonia	47	00	45	00	S
Slego in Ireland	15	35	54	15	S
Slowoda	68	20	64	30	S
Slowoda	86	30	56	51	S
Smyrna	60	21	40	29	S
Snavel	2	30	64	21	S

S T	Longit.		Latitude	
Sorlings	18	00	50	00
Spacado	46	50	45	21
Spier	35	30	49	21
Spina	60	50	43	29
Stad	30	40	61	41
Staphole	2	20	65	41
Stetin	41	10	53	51
Stoby	52	30	44	00
Stocholme	41	00	58	11
Straights of Maturchin	74	30	73	11
Swedia Reg.	40	00	60	00
Sumatra an Iſland	134	00	00	05
Sohar	92	23	23	05
Surrat	109	50	20	07
Swally wad	103	31	21	20
Saldania bay	49	40	33	40
Silly	18	00	50	02
Stert	22	50	50	40
Sweinburne head	25	00	59	51
Syria	74	00	39	00
Siracuſæ	45	41	37	00
Southampton	24	05	51	11
T				
Taranto	48	00	40	29
Tarapaca	306	21	30	41S
Tarbacan	109	29	34	51
Targa Reg.	32	00	25	00
Taragona	29	29	40	41
Tarſo	71	21	40	00
Tartar	152	00	63	21
Tartaria Reg.	130	00	62	00
Tarken Reg.	129	00	49	00
Tatracan	55	00	44	51
Tecou	116	29	00	41S
Tenariſſe	8	11	27	29
Tendua Reg.	170	00	59	00
Teneſab	46	41	61	11
Tarcera	358	23	39	00

T V	Longit.		Latitude	
Terra alta	160	29	06	51S
Terra alta	45	21	15	21
Ter de los ſumos	322	29	40	21S
Tharſis	115	29	49	00
Theſſalonia	53	44	44	21
Texel in Holland	31	00	53	15
Thoulouſe	28	40	43	50
Thunnis	67	40	32	00
Tygris a River	84	00	34	30
Tocrors	54	50	46	00
Togora	146	00	49	50
Toledo	22	50	39	40
Tollon	34	05	43	20
Toul	33	10	40	10
Toures	27	30	47	50
Trent	40	10	46	10
Trisgean Iſland	278	40	21	00
Tribanta	63	30	41	50
Trinidad	355	20	19	10S
Trinidad	295	50	21	20
Trinidad	319	20	09	00
Trinity Harbour	308	30	36	00
Tripolis antiqua	44	21	30	20
Tripolis in Barba	45	21	30	39
Tripolis ſoria	72	21	37	00
Troyja	59	00	42	30
Troy	31	00	48	10
Tuna	41	51	04	30
Turſon	131	30	56	30
Tyrus	71	35	55	30
Tzerca	79	50	49	20
Taleo	159	00	03	30
Ternato	160	50	00	55
Tidore	160	50	00	50
Timore	139	12	10	20S
Tunnis	40	00	36	00
V				
Valentia	29	20	39	41
Varcano	107	50	39	00

V W	Longi.		Latitude	
Varon	83	30	70	30
Vaygats an Island	81	30	69	21
Venice	41	40	45	51
Verma Reg.	133	00	2	30
Varona	4	40	45	30
Viana	17	30	42	00
Vlie	87	50	59	30
Vienna	45	30	48	30
Villa longa	18	20	07	40
Ville conde	17	00	41	30
Virginia	302	01	36	00
Vifhgrod	61	30	51	30
Bona Vifta	2	30	15	30
Buena Vifta	308	04	40	11
Buena Vifta	177	30	13	30
Ulm	37	50	48	50
Volga a River	75	40	58	00
Upfalia	42	50	60	00
Vigis a River	85	50	53	20
Vifting	79	30	61	30
W				
Waersberghan, Wardhouse	39	01	57	20
Earle Warwicks foreland	50	30	70	26
Waterford	323	11	62	01
Count Warwicks found	17	15	52	16
Wakefield	330	41	64	41
Waffilgo road	23	48	53	45
Waxon	81	50	56	41
Waymouth	49	20	52	19
Welichy	23	50	51	00
Wilikipoyaffa	96	30	56	00
Wolifa	101	20	63	29
Weroy	63	40	56	51
Weffel	39	50	68	41
	31	29	51	29

W X Y Z	Longit		Latitude	
Weſterfold	40	29	67	41
Wirbay	24	26	55	00
Whitſonhead	316	05	41	45
Wibo ough	56	29	62	35
White Iſle	25	11	50	29
Sir Hugh Willoughbies Iſland	60	00	72	00
Winterton	28	20	58	29
Wologda	73	50	09	29
Wologda	74	30	60	00
X				
Aques	182	20	20	29
Y				
Armouth	27	30	53	00
York	23	30	54	29
Yuagua	303	30	21	00
Yuchope	22	56	56	20
Z				
Acana a Ri.	6	40	13	00 S
Zacatula	269	40	20	00
Z catanan I.	88	00	12	51
Z ma	49	30	14	00 S
Zama	74	41	11	41
Zante	52	00	38	00
Zellam	104	00	08	00
Zanhage Reg.	20	00	24	00
Zanziber	37	52	05	29 S
Zara	46	25	45	41
Zaradus a River	126	00	94	00
Zavan	41	29	51	00
Zedica	48	00	29	29
Zegzeg Reg.	56	41	14	41
Zovazembla	83	29	74	00
Zingais	76	11	49	29
Zoidafanel	137	31	03	51 S
Zuenzigna Reg.	15	00	15	00

Lapland.

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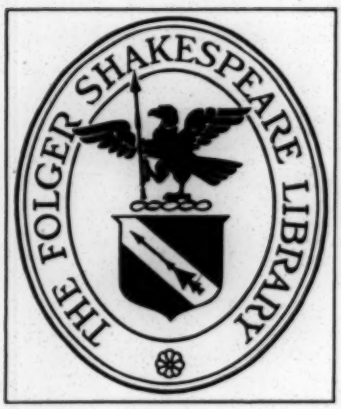

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10/24/90 - 2/18/91	p. 11